Ai 7/3/984

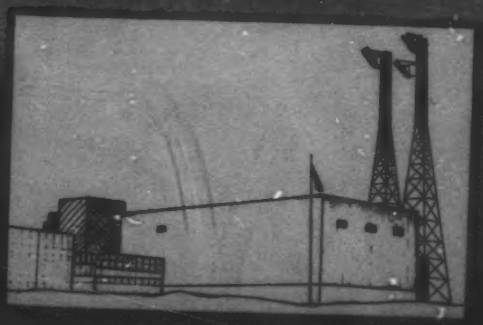
Air Traffic Control

7110.65D
October 25, 1984

NEWARK PUBLIC LIBRARY

SEP 25 1984

U. S. GOVT. PUBS.
DEPOSITORY 376



US Department of Transportation
Federal Aviation Administration

TD 4.308:

AIR TRAFFIC CONTROL

7110.65D

FOREWORD

This handbook prescribes air traffic control procedures and phraseology for use by personnel providing air traffic control services. Controllers are required to be familiar with the provisions of this handbook that pertain to their operational responsibilities and to exercise their best judgement if they encounter situations not covered by it.

R.J. Van V

R. J. Van Vuren
Associate Administrator for Air Traffic

Distribution: ZAT-710

Initiated by: AAT-300

COMPENDIUM

Page

FOREWORD i
EXPLANATION OF THE REORGANIZED HANDBOOK vii
CROSS-REFERENCE INDEX xi

Chapter 1. INTRODUCTION

TABLE OF CONTENTS 1-i
Section 1. GENERAL 1-1
Section 2. TERMS OF REFERENCE 1-3

Chapter 2. GENERAL

TABLE OF CONTENTS 2-i
Section 1. GENERAL 2-1
Section 2. FLIGHT PLANS AND CONTROL INFORMATION 2-9
Section 3. FLIGHT PROGRESS STRIPS 2-13
Section 4. RADIO AND INTERPHONE COMMUNICATIONS 2-20
Section 5. ROUTE AND NAVAID DESCRIPTION 2-27
Section 6. WEATHER INFORMATION 2-28
Section 7. ALTIMETER SETTINGS 2-31
Section 8. RUNWAY VISIBILITY REPORTING—TERMINAL 2-32

Chapter 3. AIRPORT TRAFFIC CONTROL—TERMINAL

TABLE OF CONTENTS 3-i
Section 1. GENERAL 3-1
Section 2. VISUAL SIGNALS 3-4
Section 3. AIRPORT CONDITIONS 3-5
Section 4. AIRPORT LIGHTING 3-8
Section 5. RUNWAY SELECTION 3-12
Section 6. AIRPORT SURFACE DETECTION PROCEDURES 3-13
Section 7. TAXI AND GROUND MOVEMENT PROCEDURES 3-14
Section 8. SPACING AND SEQUENCING 3-17
Section 9. DEPARTURE PROCEDURES AND SEPARATION 3-19
Section 10. ARRIVAL PROCEDURES AND SEPARATION 3-24
Section 11. HELICOPTER OPERATIONS 3-30
Section 12. SEA LANE OPERATIONS 3-33

Chapter 4. IFR

TABLE OF CONTENTS 4-i
Section 1. NAVAID USE LIMITATIONS 4-1
Section 2. CLEARANCES 4-3
Section 3. DEPARTURE PROCEDURES 4-5
Section 4. ROUTE ASSIGNMENT 4-9
Section 5. ALTITUDE ASSIGNMENT AND VERIFICATION 4-11
Section 6. HOLDING AIRCRAFT 4-15
Section 7. ARRIVAL PROCEDURES 4-18
Section 8. APPROACH CLEARANCE PROCEDURES 4-23

Chapter 5. RADAR

TABLE OF CONTENTS 5-i
Section 1. GENERAL 5-1
Section 2. BEACON SYSTEMS 5-4
Section 3. RADAR IDENTIFICATION 5-10
Section 4. TRANSFER OF RADAR IDENTIFICATION 5-12
Section 5. RADAR SEPARATION 5-15
Section 6. VECTORING 5-18
Section 7. SPEED ADJUSTMENT 5-20

READEX FICHE

COMPENDIUM—Continued

Page
Section 8. RADAR DEPARTURES 5-22
Section 9. RADAR ARRIVALS 5-25
Section 10. RADAR APPROACHES—TERMINAL 5-29
Section 11. SURVEILLANCE APPROACHES—TERMINAL 5-33
Section 12. PAR APPROACHES—TERMINAL 5-35
Section 13. USE OF PAR FOR APPROACH MONITORING—TERMINAL 5-37
Section 14. AUTOMATION—EN ROUTE 5-39
Section 15. AUTOMATED RADAR TERMINAL SYSTEMS (ARTS)—TERMINAL 5-41
Section 16. TPX-42—TERMINAL 5-43

Chapter 6. NONRADAR

TABLE OF CONTENTS 6-i
Section 1. GENERAL 6-1
Section 2. INITIAL SEPARATION OF SUCCESSIVE DEPARTING AIRCRAFT 6-2
Section 3. INITIAL SEPARATION OF DEPARTING AND ARRIVING AIRCRAFT 6-4
Section 4. LONGITUDINAL SEPARATION 6-5
Section 5. LATERAL SEPARATION 6-9
Section 6. VERTICAL SEPARATION 6-12
Section 7. TIMED APPROACHES 6-13

Chapter 7. VISUAL

TABLE OF CONTENTS 7-i
Section 1. GENERAL 7-1
Section 2. VISUAL SEPARATION 7-2
Section 3. VFR-ON-TOP 7-3
Section 4. APPROACHES 7-4
Section 5. SPECIAL VFR 7-7
Section 6. BASIC RADAR SERVICE TO VFR AIRCRAFT—TERMINAL 7-11
Section 7. STAGE II SERVICE—TERMINAL 7-12
Section 8. STAGE III SERVICE—TERMINAL 7-14

Chapter 8. SPECIAL FLIGHTS

TABLE OF CONTENTS 8-i
Section 1. GENERAL 8-1
Section 2. SPECIAL INTEREST FLIGHTS 8-2
Section 3. SPECIAL OPERATIONS 8-4
Section 4. SPECIAL USE AND ATC ASSIGNED AIRSPACE 8-11
Section 5. FUEL DUMPING 8-13
Section 6. JETTISONING OF EXTERNAL STORES 8-14
Section 7. UNMANNED FREE BALLOONS 8-15
Section 8. PARACHUTE JUMPING 8-17

Chapter 9. EMERGENCIES

TABLE OF CONTENTS 9-i
Section 1. GENERAL 9-1
Section 2. EMERGENCY ASSISTANCE 9-3
Section 3. CONTROL ACTIONS 9-9
Section 4. DIRECTION FINDER SERVICE 9-10
Section 5. MISCELLANEOUS OPERATIONS 9-13
Section 6. GROUND MISSILE EMERGENCIES 9-14

Chapter 10. CANADIAN AIRSPACE PROCEDURES

TABLE OF CONTENTS 10-i
Section 1. GENERAL CONTROL 10-1
Section 2. IFR OPERATIONS 10-3
Section 3. RADAR OPERATION 10-6
Section 4. FUEL DUMPING 10-8

COMPENDIUM—Continued

APPENDICES

Page
Appendix A. PILOT/CONTROLLER GLOSSARY A-1
Appendix B. AIRCRAFT WEIGHT CLASSES AND GROUPS B-1
Appendix C. STANDARD OPERATING PRACTICE (SOP) FOR TRANSFER OF RADAR IDENTIFICATION AND ASSOCIATED COORDINATION C-1
Appendix D. STANDARD OPERATING PRACTICE (SOP) FOR THE TRANSFER OF POSITION RESPONSIBILITY D-1
INDEX I-1

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

EXPLANATION OF THE REORGANIZED HANDBOOK

This entire order has been reorganized, and a simple explanation of the changes is not possible. However, to aid you in understanding how each chapter was developed and what subject matter was incorporated into each chapter, we have prepared this explanation of the reorganized handbook. Besides this explanation, we have provided two cross-reference indexes, which will help you refer from a paragraph in 7110.65D back to the comparable paragraph in 7110.65C as well as going from the old ".65C" to the new ".65D."

Also, we found that the Table of Contents in the front of the old order was cumbersome to the point where the quick referencing of a subject was difficult. Therefore, we elected to put only a compendium (an outline) of the chapters and sections in the front of this order and to put a complete table of contents in the front of each chapter. For example, if you want information about radar, turn to the Radar chapter, Chapter 5, and look up the pertinent paragraphs in that chapter's Table of Contents. Then, after locating the necessary paragraphs, you will already be in the desired chapter.

In a further attempt to help you find the desired information, we have numbered both the paragraphs and the pages according to the chapters. For example, Paragraph 5-6 is Chapter 5, Paragraph 6, and Page 5-6 is Chapter 5, Page 6.

A major effort was made to alleviate excessive referencing in the order. The largest number of complaints about referencing concerned the old Chapter 6, Wake Turbulence. We discussed this subject at great length and decided that it was necessary to delete that chapter entirely. The applicable paragraphs were incorporated in the areas where they apply. In some cases, they were duplicated; i.e., the same procedure will be found in more than one place.

A note of caution should be taken at this juncture, especially in consideration of deleting the Wake Turbulence chapter, to understand that duplication of paragraphs was also a complaint of 7110.65C. Where at all possible, we have referenced the appropriate paragraphs rather than duplicating the procedure. Unfortunately, these two items, referencing and duplicating, could not be totally resolved. However, these items were continually dealt with and discussed during the reorganization effort. Now, more often than in the past, the referenced paragraph will be found in the same section because we have tried to group like and similar material together; and, overall, there are fewer references than before.

Where like and similar subject material could be grouped according to phase of flight, it was done. The format begins with general information, followed by flight plan information, then airport traffic control. Continuing from that point, we elected to provide general information about IFR clearances/operations that are employed by en route as well as terminal controllers whether it be radar or nonradar. This general information is followed by Chapter 5, Radar. Chapter 6, Nonradar, is located after the Radar Chapter because radar is the more common means of separating aircraft. However, this chapter was placed adjacent to Chapter 5 because there are times when radar controllers will use nonradar standards; i.e., vertical separation.

Per comment, discussion, and for ease of reference to any operation that a pilot conducts in visual conditions or by visual contact, we have developed a new chapter, called Visual. This chapter deals with the services to IFR/VFR aircraft not only in a radar environment but in a nonradar environment and also in areas served by VFR towers. It was developed as a result of many comments.

We have reviewed all the paragraphs and have effected small changes in the chapter on Special Flights and the chapter on Emergencies. We believe these two chapters provide information in a suitable format that should not be incorporated into other chapters.

A further explanation and discussion of each chapter follows below.

Chapter 1 groups all the administrative functions that were scattered throughout the handbook. By placing the administrative functions in the lead chapter, you will have a convenient explanation of how to use the handbook and of the word meanings used. The Abbreviations were incorporated into Section 2, Terms of Reference.

Chapter 2 includes all the basic information needed for the application of ATC by all options. Section 1 contains general information pertaining to procedures and requirements, such as duty priority, control transfer, and operational requests. Two wake turbulence paragraphs were added to this section since they are general statements used by all options. Section 2 groups together those paragraphs related to the recording and the forwarding of control information. Section 3 remains mostly unchanged except for the addition of the old Appendices 1 and 2. This combines all the information related to flight progress strips into one section. Sections 4, 5, and 7 remain unchanged because they were considered clear in their intent and arrangement, but they were retitled to describe better their subject matter. Section 6 brings together information related to the issuance of weather information. Section 8, Runway Visibility, was brought into this chapter because it is used by two or more options.

Chapter 3 was designed to group together the procedures and the information that are required by the tower/cab function. Information on this topic had been separated throughout the old handbook, such as Airport Conditions, Airport Lighting, Runway Selection (Usage), Runway Visibility, etc. By realigning these sections, a more sequential flow of the subject material is provided. By grouping together like and similar subjects, three new major sections were developed — Departure Procedures and Separation, Arrival Procedures and Separation, and Helicopter Operations. Again, the intent is to provide for a logical sequence of use. Also, the Sea Lane Operations section was moved from Special Flight Operations as only a tower can provide this separation. Section 5, Runway Selection, is the old Runway Use section. Appropriately, it deals with the decision to select one runway over another and not necessarily with how that runway will be used to effect the separation standards that are located in the Arrival and Departure sections. LLWAS was moved into Section 1, General, as it applies to both arrivals and departures. Ground taxi procedures involving heavy aircraft were also moved into this chapter. A major improvement is the relocation of Departure Procedures and combining them with Departure Separation. This was also accomplished with the two sections on Arrival Procedures and Arrival Separation. It was necessary to divide paragraphs from wake turbulence and place them in this chapter based on the usage of the procedure. The old paragraphs that are accomplished by a tower controller were 1435a(4), (5), (6), (7), 1425b, and 1406b. The old helicopter paragraphs have been combined into a section specifically for helicopters. The old paragraphs were 972d, e, f, 997, 1030, 1021, and 1131 and follow the format of grouping together like and similar subjects.

Chapter 4 has been designed to provide information and phraseology for the issuance of flight plans. The grouping of like and similar subjects prevails herein along with the phase of flight concept, which is evidenced by the order of the sections. Section 1, NAVAID Use Limitations, was placed in this chapter since the information is required for the formulation of a clearance. The old Altitude Assignment and Verification sections were combined into Section 5. The old paragraph 974a, ILS Protection/Critical Areas, was subdivided and inserted into section 6, Holding Aircraft. Radio Frequency and Radar Beacon Changes for Military Aircraft along with Single Frequency Approaches were moved from the Approach Procedures section to the Arrival Procedures section since both are procedures to be employed prior to the execution of an approach. Finally, Communications Release, old paragraph 390, has been placed in the Approach section as it pertains to the release of an aircraft executing an approach. Similarly, the old paragraphs 382 and 395, which deal primarily with approach clearances, were inserted into the Approach section.

Chapter 5 contains information based soley on the use of radar and has been reordered to meet the grouping guidelines. Whereas wake turbulence criteria were previously located in a separate chapter, they have now been placed with their appropriate sensitive paragraphs with the notation *WAKE TURBULENCE APPLICATION*. This will facilitate understanding where and when these criteria must be applied. Specific paragraphs — Merging Target Procedures, Monitoring of Holding Patterns, Advisories to Deviating Aircraft, and Position Reports — have been moved into Section 1, General, as they pertain to both the en route and the terminal functions. Section 2, Beacon Systems includes the Beacon Code Assignment section from the old Chapter 4 as well as such related items as information about Mode C, verification of altitude, and VFR code assignments. Radar Separation and Radar Separation Minima have been combined and the appropriate wake turbulence paragraphs added. A new Section 14, Automation En Route, has been developed to incorporate future enhancements to the ATC system in the form of en route automation. The section includes Conflict Alert for the en route option as well as E-MSAW. Material that relates to the use and function of terminal automated equipment has been grouped within separate sections to provide a common reference area for the material.

Chapter 6 contains in one chapter those paragraphs that apply to nonradar operations and separation standards. Additionally, for ease of use and reference, two paragraphs on wake turbulence have been incorporated. One point of contention pertained to the inclusion of vertical separation. Since it applies to all phases of ATC, vertical separation provides a form of separation that does not require radar. Furthermore, vertical separation is integral to the nonradar curriculum at the Mike Monroney Aeronautical Center. Therefore, vertical separation has been included in this chapter both for quick reference during the use of nonradar operations and to preclude excessive duplication. Section 7, Timed Approaches, was also contentious. Although radar may be employed to establish an aircraft on the approach course, nonradar procedures are the standard to be applied from the final approach fix to the airport. In cases where radar procedures are not used to establish the aircraft on the timed approach, other nonradar procedures in this section would apply.

Chapter 7 was developed as a direct result of comments which expressed dissatisfaction with the numerous references to IFR/VFR operations conducted by aircraft using visual references. We have organized into this chapter widely dispersed paragraphs on visual operations that could be removed from other sections without having an adverse effect on those sections. The method of operation; i.e., visual references, visual separation, and services to VFR aircraft including STAGE II and III, have been grouped together. It may be argued that STAGE III does not apply except where radar is used as a tool to accomplish the separation. That argument is valid. However, if the radar is inoperative, the segregation of VFR aircraft from IFR aircraft is still addressed in the section, and it should be noted that TRSA's/TCA's do not automatically disappear. Some procedures contained in the Basic Services and Stage II Services sections may be applied within a TRSA/TCA in the event of a radar outage. Therefore, the three sections remain intact and adjacent to each other.

Chapter 8 also groups like and similar subjects together. Those matters that pertained to Special Use Airspace throughout the old handbook have been combined in Section 2. A major change and improvement to Section 3 was the listing of all Special Operations, including Law Enforcement Alerts (removed from Emergencies), in alphabetical order to facilitate the location and the use of the information contained within each paragraph.

Chapter 9 remains basically intact. The only change was the relocation of Law Enforcement Alerts to Chapter 8.

Chapter 10 contains the Canadian procedures. The chapter has been revised as a result of both the reorganization of Canadian airspace, which was effective May 10, 1984, and the recommendations of the NAR (National Airspace Review) Task Group 1-5.3, which addressed the integration of common U.S. and Canadian procedures. Changes were made to accomodate the reorganization of Canadian airspace. Also, changes were made to include those Canadian ATC procedures that are more stringent than U.S. procedures. Finally, the chapter was reviewed for accuracy and revised where required.

Appendix A contains the Pilot/Controller Glossary, the old Appendix 4.

Appendix B contains the Aircraft Weight Classes and Groups, the old Appendix 3.

Appendix C contains the Standard Operating Practice (SOP) for Transfer of Radar Identification and Associated Coordination, the old Appendix 5.

Appendix D contains the Standard Operating Practice for the Transfer of Position Responsibility, the old Appendix 6.

[illegible]

[illegible]

7110.65D Paragraph Cross Reference

.65C	.65D	.65C	.65D	.65C	.65D
APP1	2-50	70	2-70	220	6-50
APP1	2-59	71	2-71	221	6-52
APP2	2-57	72	2-72	222	6-51
APP3	APPB	73	2-73	223	6-53
APP4	APPA	74	2-74	224	8-41
APP5	APPC	75	2-75	230	4-40
APP6	APPD	76	2-76	231	4-41
NONE	1-22	77	2-77	232	4-42
NONE	10-6	78	2-78	233	4-45
NONE	10-7	79	2-79	234	5-192
NONE	10-8	80	2-80	235	4-46
NONE	10-36	82	2-81	236	4-44
1	1-1	83	2-82	237	4-43
2	1-2	84	2-83	250	4-47
3	1-3	85	2-84	251	5-37
4	1-4	86	2-85	252	5-38
5	1-5	87	2-86	253	5-193
7	1-20	88	2-87	254	6-2
8	1-21	100	2-90	255	6-3
9	1-23	101	2-91	270	6-30
10	1-6	102	2-92	271	6-31
11	1-7	103	2-10	272	6-32
14	2-1	110	2-110	273	6-33
15	1-9	111	2-111	274	6-34
16	1-8	120	2-30	280	6-40
17	2-11	121	2-31	281	6-43
18	2-12	122	2-32	282	6-41
21	1-24	123	2-34	283	6-42
22	2-2	124	2-35	284	6-44
23	2-3	125	2-37	285	8-41
24	2-4	130	2-38	290	4-30
25	2-15	131	2-39	291	4-34
26	2-17	132	2-40	292	4-33
27	2-13	133	2-41	293	4-31
28	2-18	134	2-42	294	4-32
29	2-5	150	2-50	320	4-50
30	5-39	151	2-51	321	4-51
31	2-7	152	2-52	322	4-52
32	2-16	156	2-53	323	4-53
33	2-6	157	2-43	324	4-56
34	2-14	159	2-54	325	4-54
35	2-8	160	2-55	326	4-55
36	2-23	161	2-56	340	6-10
37	2-9	162	2-57	341	6-11
40	2-100	163	2-59	345	6-20
41	2-101	164	2-58	350	4-21
42	2-105	180	DELETED	351	4-22
45	2-2	181	6-1	352	4-23
46	2-21	182	7-1	353	4-24
47	5-8	190	4-10	354	4-26
48	5-9	191	4-11	355	4-25
49	2-102	192	2-92	356	4-27
50	2-103		4-12	357	4-28
51	2-106	193	4-13	358	2-33
52	2-22	194	4-14	380	4-60
55	4-1	195	4-15	381	4-61
56	4-2	196	4-16	382	4-81
57	4-3	197	4-17	383	4-64
58	4-4	198	4-18	384	4-65
59	4-5	199	4-20	385	4-69

7110.65D Paragraph Cross Reference

.65C	.65D
390	4-87
391	4-66
392	4-71
393	3-121
394	4-72
395	4-82
400	4-68
401	4-70
402	4-73
403	4-67
420	4-80
421	4-88
422	4-83
423	4-85
424	4-84
429	4-89
430	7-30
432	7-35
433	4-63
434	4-62
435	4-90
436	4-91
437	4-86
450	6-60
451	6-61
452	6-65
453	6-64
454	6-66
455	6-63
456	6-62
470	7-40
471	7-44
472	7-45
473	7-42
474	7-43
475	7-48
476	7-41
477	7-46
478	7-47
490	7-10
491	7-2
492	7-20 8-42
493	7-21
600	5-1
601	5-2
602	5-194
603	5-195
604	5-33
605	5-3
606	5-6
607	5-5
608	5-7
620	5-20
621	5-22
622	5-21
623	5-23
624	5-24
625	5-25
630	5-29
631	5-27
632	5-28
633	5-32
634	5-35
635	5-34
636	5-40
637	5-36
638	5-30
639	2-36
640	5-26
641	5-31
650	5-50
651	5-56
652	5-13
653	5-11
654	5-51
655	5-52
656	5-53
660	5-57
661	5-54
662	5-55
663	5-10
664	5-12
680	5-90
681	5-91
700	5-60
701	5-61
702	5-62
703	5-63 5-64 5-65 5-66
720	5-70
721	5-71
722	5-4
723	5-190 5-215
724	5-191
740	5-72
741	5-73
742	5-113
743	5-114
744	5-115
745	5-74
750	5-76 8-41
751	5-77
755	5-78
756	5-79
757	5-75
770	5-110
771	5-111
772	3-102 5-32
773	5-112
790	5-120
791	5-121
793	5-122
794	5-123
795	5-124
796	7-31 7-32 7-33 7-34
797	5-125
798	5-126
820	5-100
821	5-101
822	5-102
823	5-103
824	5-104
840	5-196
841	5-197
900	3-1
901	3-6
902	3-5
903	3-2
904	3-4
905	3-7
906	3-9
910	3-31
912	3-11
913	3-10
920	3-20
921	3-21
922	3-22
940	3-30
941	3-32
942	3-33
943	3-34
950	3-35
960	3-60
961	3-62
962	3-61
963	2-104
970	3-80
971	3-3
972	3-81 3-140
973	3-83
974	3-84 4-57
980	3-100
981	3-8
982	3-101
983	3-102
984	3-103
993	3-107
994	3-105
995	3-109
996	3-110
997	3-141
1010	3-120
1011	7-3
1012	7-4
1013	3-124
1014	3-125
1020	3-126
1021	3-145
1022	3-128

7110.65D Paragraph Cross Reference

.65C	.65D
1023	3-129
1024	3-130
1025	3-134
1026	3-133
1027	3-132
1040	3-55
1041	3-56
1042	3-40
1043	3-43
1050	3-44
1051	3-45
1052	3-47
1053	3-54
1054	3-52
1055	3-46
1056	3-49
1060	3-51
1061	3-48
1062	3-50
1063	3-53
1064	3-41
1065	3-42
1080	2-120
1081	2-121
1082	2-122
1100	3-90
1101	3-91
1102	3-131
1103	3-92
1104	3-93
1110	3-106
1111	3-108
1112	3-104
1113	3-107
1114	3-93
1120	3-122
1121	3-123
1122	3-127
1130	3-142
1131	3-143
1132	3-144
1140	7-48
1141	7-49
1150	5-130
1151	5-131
1152	5-133
1153	5-132
1154	5-134
1160	5-135
1161	5-136
1162	5-137
1163	5-138
1164	5-139
1170	5-140
1171	5-141
1172	5-142
1173	5-143
1174	5-144
1190	5-150
1191	5-151

.65C	.65D
1192	5-152
1193	5-153
1194	5-154
1195	5-155
1200	5-160
1201	5-161
1202	5-162
1203	5-163
1204	5-164
1210	5-165
1211	5-166
1212	5-167
1213	5-168
1214	5-169
1220	5-180
1221	5-181
1222	5-182
1223	5-183
1240	7-60
1241	2-16
1250	7-70
1251	7-71
1252	7-72
1253	7-73
1260	7-74
1261	7-75
1262	7-76
1263	7-77
1264	7-78
1265	7-79
1266	7-80
1280	7-90
1281	7-91
1282	7-92
1283	7-93
1284	7-94
1285	7-95
1286	7-96
1287	7-97
1300	3-70
1301	3-71
1302	3-72
1310	5-210
1311	5-211
1312	5-212
1313	5-213
1314	5-214
1315	5-217
1316	5-216
1350	5-220
1351	5-221
1352	5-222
1353	5-223
1354	5-224
1355	5-225
1356	5-226
1400	2-19
1402	3-93
1403	DELETED
1404	3-107

.65C	.65D
1405	3-106
1406	3-82 3-140
1420	5-72
1425	3-123 6-5
1426	3-106 3-108
1427	6-4
1428	3-106
1435	2-20 3-122 3-123
1450	8-1
1451	8-2
1452	8-3
1460	8-40
1461	8-43
1470	8-50
1471	8-51
1472	8-52
1473	8-53
1474	8-54
1480	8-10
1481	8-11
1482	8-12
1490	8-80
1491	8-81
1492	8-82
1493	8-83
1500	8-22
1501	8-37
1502	8-20
1503	8-36
1504	8-25
1506	8-33
1507	8-35
1508	8-26
1511	8-21
1512	8-34
1513	8-29
1514	8-31
1515	8-30
1516	8-23
1517	8-24
1518	8-27
1519	8-38
1520	3-150
1521	3-151
1522	3-152
1530	8-70
1531	8-71
1540	8-60
1550	9-1
1551	9-2
1552	9-3
1553	9-4
1554	9-5
1555	9-3
1556	9-6

7110.65D Paragraph Cross Reference

.65C	.65D
1570	9-10
1571	9-11
1572	9-12
1573	9-13
1574	9-14
1575	9-15
1576	9-16
1580	9-17
1581	9-18
1582	9-19
1583	9-20
1584	9-21
1585	9-22
1590	9-23
1591	9-24
1592	9-25
1593	9-26
1594	8-32
1595	9-27
1596	9-28
1597	9-29
1598	9-30
1599	9-31
1600	9-40
1601	9-41
1602	9-42
1603	9-43
1610	9-50
1611	9-51
1612	9-52
1613	9-53
1614	9-54
1620	9-55
1621	9-56
1640	9-60
1641	9-61
1642	8-28
1643	9-62
1660	9-70
1661	9-71
1662	9-72
1663	9-73
1664	9-74
1700	10-1
1701	10-2
1702	10-3
1703	10-4
1704	10-5
1710	10-10 10-11
1711	10-12
1712	10-13
1713	10-14
1714	10-15
1715	10-16
1716	10-17
1717	10-18
1730	10-30
1731	10-31
1732	10-32
1733	10-33
1734	10-34
1735	DELETED
1736	10-35
1750	10-50
1751	10-51

7110.65D Paragraph Cross Reference

65D	65C
APPA	APP4
APPB	APP3
APPC	APP5
APPD	APP6
DELETED	180
DELETED	1403
DELETED	1735
1-1	1
1-2	2
1-3	3
1-4	4
1-5	5
1-6	10
1-7	11
1-8	16
1-9	15
1-20	7
1-21	8
1-22	NONE
1-23	9
1-24	21
2-1	14
2-2	22 45
2-3	23
2-4	24
2-5	29
2-6	33
2-7	31
2-8	35
2-9	37
2-10	103
2-11	17
2-12	18
2-13	27
2-14	34
2-15	25
2-16	32 1241
2-17	26
2-18	28
2-19	1400
2-20	1435
2-21	46
2-22	52
2-23	36
2-30	120
2-31	121
2-32	122
2-33	358
2-34	123
2-35	124
2-36	639
2-37	125
2-38	130
2-39	131
2-40	132
2-41	133
2-42	134
2-43	157
2-50	APP1 150
2-51	151
2-52	152
2-53	156
2-54	159
2-55	160
2-56	161
2-57	APP2 162
2-58	164
2-59	APP1 163
2-70	70
2-71	71
2-72	72
2-73	73
2-74	74
2-75	75
2-76	76
2-77	77
2-78	78
2-79	79
2-80	80
2-81	82
2-82	83
2-83	84
2-84	85
2-85	86
2-86	87
2-87	88
2-90	100
2-91	101
2-92	102 192
2-100	40
2-101	41
2-102	49
2-103	50
2-104	963
2-105	42
2-106	51
2-110	110
2-111	111
2-120	1080
2-121	1081
2-122	1082
3-1	900
3-2	903
3-3	971
3-4	904
3-5	902
3-6	901
3-7	905
3-8	981
3-9	906
3-10	913
3-11	912
3-20	920
3-21	921
3-22	922
3-30	940
3-31	910
3-32	941
3-33	942
3-34	943
3-35	950
3-40	1042
3-41	1064
3-42	1065
3-43	1043
3-44	1050
3-45	1051
3-46	1055
3-47	1052
3-48	1061
3-49	1056
3-50	1062
3-51	1060
3-52	1054
3-53	1063
3-54	1053
3-55	1040
3-56	1041
3-60	960
3-61	962
3-62	961
3-70	1300
3-71	1301
3-72	1302
3-80	970
3-81	972
3-82	1406
3-83	973
3-84	974
3-90	1100
3-91	1101
3-92	1103
3-93	1104 1114 1402
3-100	980
3-101	982
3-102	772 983
3-103	984
3-104	1112
3-105	994
3-106	1110 1405 1426 1428
3-107	993 1113 1404
3-108	1111 1426
3-109	995
3-110	996
3-120	1010

7110.65D Paragraph Cross Reference

65D	65C
3-121	393
3-122	1120 1435
3-123	1121 1425 1435
3-124	1013
3-125	1014
3-126	1020
3-127	1122
3-128	1022
3-129	1023
3-130	1024
3-131	1102
3-132	1027
3-133	1026
3-134	1025
3-140	972 1406
3-141	997
3-142	1130
3-143	1131
3-144	1132
3-145	1021
3-150	1520
3-151	1521
3-152	1522
4-1	55
4-2	56
4-3	57
4-4	58
4-5	59
4-10	190
4-11	191
4-12	192
4-13	193
4-14	194
4-15	195
4-16	196
4-17	197
4-18	198
4-20	199
4-21	350
4-22	351
4-23	352
4-24	353
4-25	355
4-26	354
4-27	356
4-28	357
4-30	290
4-31	293
4-32	294
4-33	292
4-34	291
4-40	230
4-41	231
4-42	232
4-43	237
4-44	236

65D	65C
4-45	233
4-46	235
4-47	250
4-50	320
4-51	321
4-52	322
4-53	323
4-54	325
4-55	326
4-56	324
4-57	974
4-60	380
4-61	381
4-62	434
4-63	433
4-64	383
4-65	384
4-66	391
4-67	403
4-68	400
4-69	385
4-70	401
4-71	392
4-72	394
4-73	402
4-80	420
4-81	382
4-82	395
4-83	422
4-84	424
4-85	423
4-86	437
4-87	390
4-88	421
4-89	429
4-90	435
4-91	436
5-1	600
5-2	601
5-3	605
5-4	722
5-5	607
5-6	606
5-7	608
5-8	47
5-9	48
5-10	663
5-11	653
5-12	664
5-13	652
5-20	620
5-21	622
5-22	621
5-23	623
5-24	624
5-25	625
5-26	640
5-27	631
5-28	632
5-29	630

65D	65C
5-30	638
5-31	641
5-32	633 772
5-33	604
5-34	635
5-35	634
5-36	637
5-37	251
5-38	252
5-39	30
5-40	636
5-50	650
5-51	654
5-52	655
5-53	656
5-54	661
5-55	662
5-56	651
5-57	660
5-60	700
5-61	701
5-62	702
5-63	703
5-64	703
5-65	703
5-66	703
5-70	720
5-71	721
5-72	740 1420
5-73	741
5-74	745
5-75	757
5-76	750
5-77	751
5-78	755
5-79	756
5-90	680
5-91	681
5-100	820
5-101	821
5-102	822
5-103	823
5-104	824
5-110	770
5-111	771
5-112	773
5-113	742
5-114	743
5-115	744
5-120	790
5-121	791
5-122	793
5-123	794
5-124	795
5-125	797
5-126	798
5-130	1150
5-131	1151

7110.65D Paragraph Cross Reference

65D	65C
5-132	1153
5-133	1152
5-134	1154
5-135	1160
5-136	1161
5-137	1162
5-138	1163
5-139	1164
5-140	1170
5-141	1171
5-142	1172
5-143	1173
5-144	1174
5-150	1190
5-151	1191
5-152	1192
5-153	1193
5-154	1194
5-155	1195
5-160	1200
5-161	1201
5-162	1202
5-163	1203
5-164	1204
5-165	1210
5-166	1211
5-167	1212
5-168	1213
5-169	1214
5-180	1220
5-181	1221
5-182	1222
5-183	1223
5-190	723
5-191	724
5-192	234
5-193	253
5-194	602
5-195	603
5-196	840
5-197	841
5-210	1310
5-211	1311
5-212	1312
5-213	1313
5-214	1314
5-215	723
5-216	1316
5-217	1315
5-220	1350
5-221	1351
5-222	1352
5-223	1353
5-224	1354
5-225	1355
5-226	1356
6-1	181
6-2	254
6-3	255
6-4	1427

65D	65C
6-5	1425
6-10	340
6-11	341
6-20	345
6-30	270
6-31	271
6-32	272
6-33	273
6-34	274
6-40	280
6-41	282
6-42	283
6-43	281
6-44	284
6-50	220
6-51	222
6-52	221
6-53	223
6-60	450
6-61	451
6-62	456
6-63	455
6-64	453
6-65	452
6-66	454
7-1	182
7-2	491
7-3	1011
7-4	1012
7-10	490
7-20	492
7-21	493
7-30	430
7-31	796
7-32	796
7-33	796
7-34	796
7-35	432
7-40	470
7-41	476
7-42	473
7-43	474
7-44	471
7-45	472
7-46	477
7-47	478
7-48	475 1140
7-49	1141
7-60	1240
7-70	1250
7-71	1251
7-72	1252
7-73	1253
7-74	1260
7-75	1261
7-76	1262
7-77	1263
7-78	1264
7-79	1265

65D	65C
7-80	1266
7-90	1280
7-91	1281
7-92	1282
7-93	1283
7-94	1284
7-95	1285
7-96	1286
7-97	1287
8-1	1450
8-2	1451
8-3	1452
8-10	1480
8-11	1481
8-12	1482
8-20	1502
8-21	1511
8-22	1500
8-23	1516
8-24	1517
8-25	1504
8-26	1508
8-27	1518
8-28	1642
8-29	1513
8-30	1515
8-31	1514
8-32	1594
8-33	1506
8-34	1512
8-35	1507
8-36	1503
8-37	1501
8-38	1519
8-40	1460
8-41	224 285 750
8-42	492
8-43	1461
8-50	1470
8-51	1471
8-52	1472
8-53	1473
8-54	1474
8-60	1540
8-70	1530
8-71	1531
8-80	1490
8-81	1491
8-82	1492
8-83	1493
9-1	1550
9-2	1551
9-3	1552 1555
9-4	1553
9-5	1554
9-6	1556
9-10	1570

7110.65D Paragraph Cross Reference

65D	65C
9-11	1571
9-12	1572
9-13	1573
9-14	1574
9-15	1575
9-16	1576
9-17	1580
9-18	1581
9-19	1582
9-20	1583
9-21	1584
9-22	1585
9-23	1590
9-24	1591
9-25	1592
9-26	1593
9-27	1595
9-28	1596
9-29	1597
9-30	1598
9-31	1599
9-40	1600
9-41	1601
9-42	1602
9-43	1603
9-50	1610
9-51	1611
9-52	1612
9-53	1613
9-54	1614
9-55	1620
9-56	1621
9-60	1640
9-61	1641
9-62	1643
9-70	1660
9-71	1661
9-72	1662
9-73	1663
9-74	1664
10-1	1700
10-2	1701
10-3	1702
10-4	1703
10-5	1704
10-6	NONE
10-7	NONE
10-8	NONE
10-10	1710
10-11	1710
10-12	1711
10-13	1712
10-14	1713
10-15	1714
10-16	1715
10-17	1716
10-18	1717
10-30	1730
10-31	1731
10-32	1732
10-33	1733
10-34	1734
10-35	1736
10-36	NONE
10-50	1750
10-51	1751

65D	65C

TABLE OF CONTENTS

Page

Chapter 1. INTRODUCTION

Section 1. GENERAL

1-1 Purpose 1-1
1-2 Distribution 1-1
1-3 Cancellation 1-1
1-4 Explanation of Major Changes 1-1
1-5 Effective Date 1-2
1-6 Recommendations for Procedural Changes 1-2
1-7 Publication and Delivery Dates 1-2
1-8 Procedural Letters of Agreement 1-2
1-9 Constraints Governing Supplements and Procedural Deviations 1-2
1-10—1-19 Reserved 1-2

Section 2. TERMS OF REFERENCE

1-20 Word Meanings 1-3
1-21 Notes 1-3
1-22 References 1-3
1-23 Annotations 1-3
1-24 Abbreviations 1-3

Chapter 1. INTRODUCTION

Section 1. GENERAL

1-1 PURPOSE

This order prescribes air traffic control procedures and phraseology for use by personnel providing air traffic control services. Controllers are required to be familiar with the provisions of this handbook that pertain to their operational responsibilities and to exercise their best judgment if they encounter situations that are not covered by it.

1-2 DISTRIBUTION

This order is distributed to selected offices in Washington Headquarters, Regional Offices, the Technical Center, and the Aeronautical Center. Also, copies are sent to all air traffic control facilities, all international aviation field offices, and the interested aviation public.

1-3 CANCELLATION

Order 7110.65C, Air Traffic Control, dated January 21, 1982, and all changes, is canceled.

1-4 EXPLANATION OF MAJOR CHANGES

The significant changes are listed below. If further information is desired, contact the office shown in parentheses.

a. 1-7 PUBLICATION AND DELIVERY DATES. Changes the Navy designator from OP-513 to OP-554. (AAT-320.6)

b. 1-9 CONSTRAINTS GOVERNING SUPPLEMENTS AND PROCEDURAL DEVIATIONS. Changes the Navy designator from OP-513 to OP-554 and the Air Force designator from AFXOOTF to AFXOORF. (AAT-320.6)

c. 1-23 ANNOTATIONS. Replaces "arrows" with "bold vertical lines" to mark the location of either substantive or editorial changes, and adds the annotation *WAKE TURBULENCE APPLICATION* when wake turbulence procedures are required. (AAT-210 and 320.4)

d. 1-24 ABBREVIATIONS. Changes the UTM definition from Unsatisfactory Transmission Message to Unsuccessful Transmission Message. (AAT-330.10)

e. 2-17 RADIO COMMUNICATIONS TRANSFER. Standardizes the use of the phrase "Remain this frequency." (AAT-320.6)

f. 2-40 FORWARDING AMENDED AND UTM DATA. See **d.**

g. 2-85 FACILITY IDENTIFICATION. Deletes the Air Force's and the Navy's communications stations. (AAT-362)

h. 2-103 WEATHER AND CHAFF SERVICES. Changes "moderate to severe icing" in 2-103b Note to "light to severe icing" to agree with paragraph 2-102a(5). (AAT-210)

i. 3-84 ILS CRITICAL AREAS. Deletes USAF exceptions to certain procedures. (AAT-320.6)

j. 3-145 HELICOPTER LANDING CLEARANCE. Deletes the phrase "Remain this frequency." See e (AAT-320.6)

k. 5-13 RADAR SERVICE TERMINATION. Makes the paragraph consistent with the Pilot/Controller Glossary by adding "VFR" to 5-13b(4). (AAT-320.2)

l. 5-90 APPLICATION (Radar Vectoring). Deletes Special IFR from the procedures. (AAT-330.8)

m. 7-92 SEPARATION (Stage III Service). Enables a controller to move helicopter traffic more efficiently into and out of landing and takeoff helipads. (AAT-320)

n. 8-41 SEPARATION MINIMA (Special Use and ATC Assigned Airspace). Makes the wording "above FL290" consistent with paragraph 6-51. (AAT-330.4)

o. 9-26 EMERGENCY LOCATOR TRANSMITTER (ELT) SIGNALS. Adds an explanatory note about the use of FAA Form 7210-8, ELT Incident. (AAT-330.10)

p. 9-60 NAVY FLEET SUPPORT MISSIONS. Corrects the name of the contact and the telephone number. (AAT-6)

q. Appendix A. PILOT/CONTROLLER GLOSSARY.

(1) Direction Altitude and Identity Readout/DAIR. Adds a new definition. (AAT-320.6)

(2) Intersection. Expands the definition to include points where taxiways and/or runways meet. (AAT-320)

(3) When Able. Adds a definition. (AAT-320.7)

1-5 EFFECTIVE DATE

This order is effective October 25, 1984.

1-6 RECOMMENDATIONS FOR PROCEDURAL CHANGES

a. Personnel should submit recommended changes in procedures to their Facility Advisory Board (FAB). Where no FAB has been established, recommended changes should be submitted directly to facility management.

b. Recommendations from other sources should be submitted through appropriate FAA, military, or industry/user channels to Headquarters, FAA; Associate Administrator for Air Traffic, attention AAT-300.

1-7 PUBLICATION AND DELIVERY DATES

a. This handbook and its changes are scheduled to be published every 112 days. The effective dates will be:

7110.65D	October 25, 1984
Change 1	February 14, 1985
Change 2	June 6, 1985
Change 3	September 26, 1985
Change 4	January 16, 1986
Change 5	May 8, 1986
Change 6	August 28, 1986
Change 7	December 18, 1986
7110.65E	April 9, 1987

b. If an FAA facility has not received the handbook/changes at least 30 days before the above effective dates, the facility shall notify the Airspace — Rules and Aeronautical Information Division, attention AAT-210.

(1) FTS (Federal Telecommunications System) 426-8949 or 426-8790.

(2) Commercial 202-426-8949 or 202-426-8790.

c. If a military facility has not received the handbook/changes at least 30 days before the above effective dates, the facility shall notify its appropriate military headquarters listed below.

(1) U.S. Army, USAATCA-ASO:

(a) Autovon 284-7773.

(b) Commercial 202-274-7773.

(2) U.S. Air Force, HQMAC (DAPD):

(a) Autovon 638-4323.

(b) Commercial 618-256-4323

(3) U.S. Navy, CNO (OP-554):

(a) Autovon 224-2710.

(b) Commercial 202-694-2710.

1-8 PROCEDURAL LETTERS OF AGREEMENT

Procedures/minima which are applied jointly or otherwise require the cooperation or concurrence of more than one facility/organization must be documented in a letter of agreement. Letters of agreement only supplement this handbook. Any minima they specify must not be less than that specified herein unless appropriate military authority has authorized application of reduced separation between military aircraft.

1-8 Reference. — Order 7210.3 — 430, Letters of Agreement.

1-9 CONSTRAINTS GOVERNING SUPPLEMENTS AND PROCEDURAL DEVIATIONS

a. Exceptional or unusual requirements may dictate procedural deviations or supplementary procedures to this handbook. Prior to implementing supplemental or any procedural deviation that alters the level, quality, or degree of service obtain prior approval from the Associate Administrator for Air Traffic.

b. If military operations or facilities are involved, prior approval by the following appropriate headquarters is required for subsequent interface with FAA:

U.S. Navy:	CNO (OP-554)
U.S. Air Force:	AFXOORF
U.S. Army:	Director, USAATCA — Aeronautical Services Office (CCQ-ASO-AT), Cameron Station, Alexandria, Virginia 22314

1-9 Note. — *TERMINAL:* Headquarters USAF has delegated to major air commands authority to authorize base commanders to reduce same runway separation standards for military aircraft. These are specified and approved by affected ATC and user units. When applied, appropriate advisories may be required; e.g., "(Ident) continue straight ahead on right side; F-16 landing behind on left." "(Ident) hold position on right side; F-5 behind on left."

1-10 thru 1-19 RESERVED

Section 2. TERMS OF REFERENCE

1-20 WORD MEANINGS

As used in this manual:

a. *Shall,* or an action verb in the imperative sense, means a procedure is mandatory.

1-20 Examples. —

Issue an alternative clearance.

Authorize the aircraft to taxi.

The transferring controller *shall forward* these data to the receiving controller.

Do not clear an aircraft to land or takeoff from a closed runway.

b. *Should* means a procedure is recommended.

c. *May* or *need not* means a procedure is optional.

d. *Will* means futurity, not a requirement for application of a procedure.

e. Singular words include the plural.

f. Plural words include the singular.

g. *Aircraft* means the airframe, crew members, or both.

h. *Approved separation* means separation in accordance with the applicable minima in this manual.

i. *Altitude* means altitude mean sea level, flight level, or both.

j. *Miles* means nautical miles unless otherwise specified, and means statute miles in conjunction with visibility.

k. *Course, Bearing, Heading, and Wind Direction* information shall always be magnetic unless specifically stated otherwise.

l. *Time* when used in the context of a clock reading is the hour in Greenwich Mean Time (GMT) or the local equivalent, as appropriate, and the minutes. Change to the next minute is made at the minute plus 30 seconds, except time checks are given to the nearest quarter minute.

1-21 NOTES

Statements of fact, of a prefatory or explanatory nature relating to directive material, are set forth as notes.

1-22 REFERENCES

As used in this handbook, references direct attention to an additional source of information.

1-23 ANNOTATIONS

Revised, reprinted, or new pages are marked as follows:

a. The change number and effective date are printed on each revised or additional page.

b. Bold vertical lines in the margin of changed pages indicate the location of either substantive or editorial revisions to the handbook.

c. Paragraphs/sections annotated with *EN ROUTE* or *TERMINAL* are only to be applied by the designated type facility. When they are not so designated, the paragraphs/sections apply to both type (en route and terminal) facilities.

d. The annotation, *USAF* for U.S. Air Force, *USN* for U.S. Navy, and *USA* for U.S. Army denotes that the procedure immediately following applies only to the service designated.

1-23d Reference. — Military Procedures, 2-12.

e. *WAKE TURBULENCE APPLICATION* inserted within a paragraph means that the remaining information in the paragraph requires the application of wake turbulence procedures.

1-24 ABBREVIATIONS

As used in this manual, the following abbreviations have the meanings indicated.

Abbreviation	*Meaning*
ACLS	Automatic Carrier Landing System
ACP	Area Command Post
ADC	Aerospace Defense Command
AIM	Airman's Information Manual
AIRMET	Airmen's meteorological information
ALNOT	Alert notice
ALS	Approach light system
ALTRV	Altitude reservation
AMB	Ambiguity — A disparity greater than 2 miles exists between the position declared for a target by ARTS and another facility's computer declared position during interfacility handoff
ANG	Air National Guard
APREQ	Approval request
ARAC	Radar approach control facility (USA)
ARCP	Air refueling control point
ARINC	Aeronautical Radio Incorporated
ARIP	Air refueling initial point
ARSR	Air route surveillance radar
ARTCC	Air route traffic control center
ASDE	Airport surface detection equipment
ASR	Airport surveillance radar
ATC	Air traffic control
ATCAA	ATC assigned airspace
ATCCC	Air Traffic Control Command Center
ATCRBS	Air traffic control radar beacon system
ATCT	Airport traffic control tower
ATIS	Automatic terminal information service

Abbreviation	*Meaning*
ATPAC	Air Traffic Procedures Advisory Committee
ATS	Air Traffic Service
CACT	Civil air carrier turbojet
CARF	Central Altitude Reservation Function
CAT	Clear air turbulence
CELNAV	Celestial navigation training
CCC	Regional Communications Control Center
CERAP	Combined Center/RAPCON
CFCF	Central Flow Control Function
CWA	Center Weather Advisory
DF	Direction finder
DH	Decision height
DMAAC	Defense Mapping Agency Aerospace Center
DMAHC	Defense Mapping Agency Hydrographic Center
DME	Distance measuring equipment compatible with TACAN
DOE	Department of Energy
ECM	Electronic counter measure
EFAS	En route flight advisory service
EFC	Expect further clearance
ELT	Emergency locator transmitter
EOVM	Emergency obstruction video map
ETA	Estimated time of arrival
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FDEP	Flight data entry and printout
FIFO	Flight Inspection Field Office
FIR	Flight information region
FL	Flight level
FLIP	Flight Information Publication
FRC	Full route clearance necessary
FSDO	Flight Standards District Office
FSNFO	Flight Standards National Field Office
FSS	Flight service station
FTS	Federal Telecommunications System
FW/SVFR	Fixed-Wing Special Visual Flight Rules
GCA	Ground controlled approach
HIRL	High intensity runway lights
ICAO	International Civil Aviation Organization
IDENT	Aircraft identification
IFR	Instrument flight rules
IFSS	International flight service station
INF	Inland Navigation Facility
INREQ	Information request
IR	IFR military training route
JATO	Jet assisted takeoff
L/MF	Low/medium frequency
LAWRS	Limited aviation weather reporting station
LLWAS	Low level wind shear alert system
MALS	Medium intensity approach light system
MALSR	Medium approach light system with runway alignment indicator lights
MAP	Missed approach point
MARSA	Military authority assumes responsibility for separation of aircraft

Abbreviation	*Meaning*
MCA	Minimum crossing altitude
MDA	Minimum descent altitude
MEA	Minimum enroute (IFR) altitude
MIRL	Medium intensity runway lights
MITO	Minimum interval takeoff
MOA	Military operations area
MOCA	Minimum obstruction clearance altitude
MSAW	Minimum Safe Altitude Warning
MRA	Minimum reception altitude
MSL	Mean sea level
MTI	Moving target indicator
MTR	Military training route
MVA	Minimum vectoring altitude
NAR	North American Route
NAS	National Airspace System
NAT	Not ARTS tracked (ARTS is not tracking the target and no ambiguity check can be made)
NBCAP	National Beacon Code Allocation Plan
NDB	Nondirectional radio beacon
NOAA	National Oceanic and Atmospheric Administration
NORAD	North American Air Defense Command
NOS	National Ocean Service
NWS	National Weather Service
NTZ	No transgression zone
ODALS	Omnidirectional approach lighting system
PAR	Precision approach radar
PDAR	Preferential departure arrival route
PBCT	Proposed Boundary Crossing Time
PCA	Positive control area
PAR	Preferential arrival route (Stage A)
PDR	Preferential departure route
PIDP	Programmable Indicator Data Processor
RAC	Department of Energy special flight
RAIL	Runway alignment indicator lights
RAPCON	Radar approach control facility (USAF)
RATCF	Radar air traffic control facility (USN)
RBS	Radar bomb scoring
RCC	Rescue Coordination Center
RCLS	Runway centerline system
RCR	Runway condition reading
REIL	Runway end identifier lights
RNAV	Area Navigation
RVR	Runway visual range
RVV	Runway visibility value
SAC	Strategic Air Command
SAFI	Semi-automatic flight inspection
SAR	Search and rescue
SFA	Single frequency approach
SFO	Simulated flameout
SID	Standard instrument departure
SIGMET	Significant meteorological information
STAR	Standard terminal arrival
STOL	Short takeoff and landing
SVFR	Special Visual Flight Rules

Abbreviation	*Meaning*
TACAN	TACAN-UHF navigational aid (omnidirectional course and distance information)
TCA	Terminal control area
TDZL	Touchdown zone light system
TRACAB	Terminal radar approach control in tower cab
TRACON	Terminal radar approach control
TRSA	Terminal radar service area
UHF	Ultra high frequency
USA	United States Army
USAF	United States Air Force
USN	United States Navy
UTM	Unsuccessful transmission message
VFR	Visual flight rules
VHF	Very high frequency
VOR	VHF navigational aid (omnidirectional course information)
VOR-DME	Collocated VOR and DME navigational aids (VHF course and UHF distance information)
VORTAC	Collocated VOR and TACAN navigation aids (VHF and UHF course and UHF distance information)
VR	VFR military training route
WSFO	Weather Service Forecast Office
WSO	Weather Service Office

TABLE OF CONTENTS

Page

Chapter 2. GENERAL

Section 1. GENERAL

2-1 ATC Service 2-1
2-2 Duty Priority 2-1
2-3 Procedural Preference 2-1
2-4 Operational Priority 2-1
2-5 Expeditious Compliance 2-2
2-6 Safety Advisory 2-2
2-7 In-Flight Equipment Malfunctions 2-3
2-8 Minimum Fuel 2-3
2-9 Reporting Essential Flight Information 2-3
2-10 NAVAID Malfunctions 2-3
2-11 Use of MARSA 2-3
2-12 Military Procedures 2-4
2-13 Formation Flights 2-4
2-14 Coordinate Use of Airspace 2-4
2-15 Control Transfer 2-4
2-16 Airport Traffic Areas 2-4
2-17 Radio Communications Transfer 2-5
2-18 Operational Requests 2-5
2-19 Wake Turbulence 2-5
2-20 Wake Turbulence Cautionary Advisories 2-6
2-21 Traffic Advisories 2-6
2-22 Bird Activity Information 2-7
2-23 Transfer of Position Responsibility 2-8
2-24—2-29 Reserved 2-8

Section 2. FLIGHT PLANS AND CONTROL INFORMATION

2-30 Recording Information 2-9
2-31 Forwarding Information 2-9
2-32 Forwarding VFR Data 2-9
2-33 Military DVFR Departures 2-9
2-34 IFR to VFR Flight Plan Change 2-9
2-35 IFR Flight Progress Data 2-9
2-36 Manual Input of Computer Assigned Beacon Codes 2-10
2-37 ALTRV Information 2-10
2-38 Computer Message Verification 2-10
2-39 Transmit Proposed Flight Plan 2-10
2-40 Forwarding Amended and UTM Data 2-11
2-41 Airborne Military Flights 2-11
2-42 Forwarding Flight Plan Data Between U.S. ARTCC's and Canadian ACC's 2-11
2-43 Teletype Flight Data Format—U.S. ARTCCs—Canadian ACC 2-11
2-44—2-49 Reserved 2-12

Section 3. FLIGHT PROGRESS STRIPS

2-50 General 2-13
2-51 Arrangement of Postings 2-14
2-52 Data Entries 2-14
2-53 Data Entries 2-15
2-54 Aircraft Identify 2-16
2-55 Aircraft Type 2-17
2-56 USAF/USN Undergraduate Pilots 2-17

Page

Chapter 2. GENERAL

2-57 Aircraft Equipment Suffix 2-17
2-58 Clearance Status 2-17
2-59 Control Symbology 2-17
2-60—2-69 Reserved 2-19

Section 4. RADIO AND INTERPHONE COMMUNICATIONS

2-70 Radio Communications 2-20
2-71 Monitoring 2-20
2-72 Authorized Interruptions 2-20
2-73 Authorized Transmissions 2-20
2-74 Authorized Relays 2-20
2-75 Radio Message Format 2-20
2-76 Abbreviated Transmissions 2-20
2-77 Interphone Transmission Priorities 2-21
2-78 Priority Interruption 2-21
2-79 Interphone Message Format 2-21
2-80 Interphone Message Termination 2-21
2-81 Words and Phrases 2-21
2-82 Emphasis for Clarity 2-21
2-83 ICAO Phonetics 2-21
2-84 Numbers Usage 2-22
2-85 Facility Identification 2-23
2-86 Aircraft Identification 2-24
2-87 Description of Aircraft Types 2-25
2-88—2-89 Reserved 2-26

Section 5. ROUTE AND NAVAID DESCRIPTION

2-90 Airways and Routes 2-27
2-91 NAVAID Terms 2-27
2-92 NAVAID Fixes 2-27
2-93—2-99 Reserved 2-27

Section 6. WEATHER INFORMATION

2-100 Familiarization 2-28
2-101 SIGMET or CWA Alert 2-28
2-102 PIREP Information 2-28
2-103 Weather and Chaff Services 2-29
2-104 Calm Wind Conditions 2-29
2-105 Reporting Weather Conditions 2-29
2-106 Disseminating Weather Information 2-30
2-107—2-109 Reserved 2-30

Section 7. ALTIMETER SETTINGS

2-110 Current Settings 2-31
2-111 Altimeter Settings Issuance Below Lowest Usable FL 2-31
2-112—2-119 Reserved 2-31

Section 8. RUNWAY VISIBILITY REPORTING — TERMINAL

2-120 Furnish RVR/RVV Values 2-32
2-121 Arrival/Departure Runway Visibility 2-32
2-122 Terminology 2-32

Chapter 2. GENERAL CONTROL

Section 1. GENERAL

2-1 ATC SERVICE

Provide air traffic control service in accordance with the procedures and minima in this handbook except when:

a. Deviation is necessary to conform with ICAO Documents, National Rules of the Air, or special agreements where the United States provides air traffic control service in airspace outside the United States and its possessions.

2-1a Note. — Pilots are required to abide by FAR's or other applicable regulations regardless of the application of any procedure or minima in this handbook.

b. Other procedures/minima are prescribed in a letter of agreement, an FAA, or a military document.

2-1b Note. — These procedures may include altitude reservations, air refueling, and fighter interceptor operations.

2-1b Reference. — Procedural Letters of Agreement, 1-8.

2-2 DUTY PRIORITY

a. Give first priority to separating aircraft and issuing safety advisories as required in this handbook. Good judgment shall be used in prioritizing all other provisions of this handbook based on the requirements of the situation at hand.

2-2a Note. — Because there are many variables involved, it is virtually impossible to develop a standard list of duty priorities that would apply uniformly to every conceivable situation. Each set of circumstances must be evaluated on its own merit and when more than one action is required, the controller shall exercise his best judgment based on the facts and circumstances known to him. That action which is most critical from a safety standpoint is performed first.

b. Provide additional services to the extent possible, contingent only upon higher priority duties and other factors including limitations of radar, volume of traffic, frequency congestion, and workload.

2-2b Note. — The primary purpose of the ATC system is to prevent a collision between aircraft operating in the system and to organize and expedite the flow of traffic. In addition to its primary function, the ATC system has the capability to provide (with certain limitations) additional services. The ability to provide additional services is limited by many factors, such as the volume of traffic, frequency congestion, quality of radar, controller workload, higher priority duties, and the pure physical inability to scan and detect those situations that fall in this category. It is recognized that these services cannot be provided in cases in which the provision of services is precluded by the above factors. Consistent with the aforementioned conditions, controllers shall provide additional service procedures to the extent permitted by higher priority duties and other circumstances. The provision of additional services is not optional on the part of the controller, but rather is required when the work situation permits.

2-3 PROCEDURAL PREFERENCE

a. Use automation procedures in preference to nonautomation procedures when workload, communications, and equipment capabilities permit.

b. Use radar separation in preference to nonradar separation when it will be to an operational advantage and workload, communications, and equipment permit.

c. Use nonradar separation in preference to radar separation when the situation dictates that an operational advantage will be gained.

2-3c Note. — One situation may be where vertical separation would preclude excessive vectoring.

2-4 OPERATIONAL PRIORITY

Provide air traffic control service to aircraft on a "first come, first served" basis as circumstances permit, except the following:

2-4 Note. — It is solely the pilot's prerogative to cancel his IFR flight plan. However, a pilot's retention of an IFR flight plan does not afford priority over VFR aircraft. For example, this does not preclude the requirement for the pilot of an arriving IFR aircraft to adjust his flight path, as necessary, to enter a traffic pattern in sequence with arriving VFR aircraft.

2-4 Reference — FAR 91.67(b), An aircraft in distress has the right of way over all other air traffic.

a. Provide priority to civilian air ambulance flights (LIFEGUARD). When requested, provide priority to military air evacuation flights (AIR EVAC, MED EVAC). Assist the pilots of air ambulance/evacuation aircraft to avoid areas of significant weather and turbulent conditions. When requested by a pilot, provide notifications to expedite ground handling of patients, vital organs, or urgently needed medical materials.

b. Provide maximum assistance to SAR aircraft performing a SAR mission.

2-4b Reference. — Providing Assistance, 9-3.

c. Provide special handling, as required to expedite Flight Check and SAFI aircraft.

2-4c Note. — It is recognized that unexpected wind conditions, weather, or heavy traffic flows may affect controller's ability to provide priority or special handling at the specific time requested.

2-4c Reference. — Flight Check and SAFI Aircraft, 8-3.

d. Expedite the movement of Presidential aircraft and entourage and any rescue support aircraft as well as related control messages when traffic conditions and communications facilities permit.

2-4d Note. — As used herein the terms Presidential aircraft and entourage include aircraft and entourage of the President, Vice President, or other public figures when designated by the White House.

2-4d Reference. — Presidential and Vice Presidential Aircraft, 2-86e. and f. Order 7210.3 — 600, Advance Coordination.

e. Expedite movement of NIGHT WATCH aircraft when NEACP (pronounced KNEECAP) is indicated in the remarks section of the flight plan or in air/ground communications.

2-4e Note. — The term "NEACP" will not be a part of the call sign but may be used when the aircraft is airborne to indicate a request for special handling.

2-4e Reference. — Order 7610.4 — 1480.

f. Provide expeditious handling for any civil or military aircraft using the code name "FLYNET."

2-4f Reference. — FLYNET, 8-25. Order 7610.4 — 1522.

g. Provide expeditious handling of aircraft using the code name "Garden Plot" only when CARF notifies you that such priority is authorized. Refer any questions regarding flight procedures to CARF for resolution.

2-4g Note. — Garden Plot flights require priority movement and are coordinated by the military with CARF. State authority will contact the Regional Director to arrange for priority of National Guard troop movements within a particular State.

h. Provide special handling for USAF aircraft engaged in aerial sampling missions using the code name "SAMP".

2-4h Reference — SAMP, 8-35. Order 7210.3 — 633, Atmospheric Sampling for Nuclear Contamination. Order 7610.4 — 1524

i. IFR aircraft shall have priority over SVFR aircraft.

2-4i Reference. — Special VFR, Chapter 7, Section 5.

2-5 EXPEDITIOUS COMPLIANCE

a. Use the word "immediately" only when expeditious compliance is required to avoid an imminent situation.

b. Use the word "expedite" only when prompt compliance is required to avoid the development of an imminent situation.

c. In either case and if time permits, include the reason for this action.

2-6 SAFETY ADVISORY

Issue a safety advisory to an aircraft if you are aware the aircraft is at an altitude which, in your judgment, places it in unsafe proximity to terrain, obstructions, or other aircraft. Once the pilot informs you action is being taken to resolve the situation, you may discontinue the issuance of further advisories. Do not assume that because someone else has responsibility for the aircraft that the unsafe situation has been observed and the safety advisory issued; inform the appropriate controller.

2-6 Note 1. — The issuance of a safety advisory is a first priority (see paragraph 2-2) once the controller observes and recognizes a situation of unsafe aircraft proximity to terrain, obstacles, or other aircraft. Conditions such as workload, traffic volume, the quality/limitations of the radar system, and the available lead time to react are factors in determining whether it is reasonable for the controller to observe and recognize such situations. While a controller cannot see immediately the development of every situation where a safety advisory must be issued, the controller must remain constantly alert for such situations and issue a safety advisory when the situation is recognized.

2-6 Note 2. — Recognition of situations of unsafe proximity may result from MSAW/E-MSAW/LAAS, automatic altitude readouts, Conflict Alert, observations on a PAR scope, or pilot reports.

2-6 Note 3. — Once the advisory is issued, it is solely the pilot's prerogative to determine what course of action, if any, he will take.

a. Terrain/obstruction advisory — Immediately issue/initiate an advisory to an aircraft if you are aware the aircraft is at an altitude which, in your judgment, places it in unsafe proximity to terrain/obstructions. Issue the advisory as follows:

Phraseology:

(Identification) LOW ALTITUDE ALERT,
CHECK YOUR ALTITUDE IMMEDIATELY.
THE, *as appropriate,* MEA/MVA/MOCA/MIA
IN YOUR AREA IS (altitude),
or if past the final approach fix,
THE, *as appropriate,* MDA/DH (if known)
IS (altitude).

b. Aircraft conflict advisory — Immediately issue/initiate an advisory to an aircraft if you are aware of another aircraft at an altitude which you believe places them in unsafe proximity. If feasible, offer the pilot an alternate course of action.

Phraseology:

(Identification) TRAFFIC ALERT,

ADVISE YOU TURN LEFT/RIGHT (specific heading, if appropriate),

and/or

CLIMB/DESCEND (specific altitude, if appropriate) IMMEDIATELY.

2-7 IN-FLIGHT EQUIPMENT MALFUNCTIONS

a. When a pilot reports an in-flight equipment malfunction, determine the nature and extent of any special handling desired.

2-7a Note. — FAR 91 requires IFR aircraft to report to ATC any loss of VOR, TACAN, ADF, or low frequency navigation receiver capability, complete or partial loss of ILS receiver capability, or impairment of air-ground communications capability. This includes the degree to which the capability of the aircraft to operate IFR in the air traffic control system is impaired and the nature and extent of any assistance desired from air traffic control.

b. Provide the maximum assistance possible consistent with equipment, workload, and any special handling requested.

c. Relay to other controllers or facilities who will subsequently handle the aircraft all pertinent details concerning the aircraft and any special handling required or being provided.

2-8 MINIMUM FUEL

If an aircraft declares a state of "minimum fuel," inform any facility to whom control jurisdiction is transferred of the minimum fuel problem and be alert for any occurrence which might delay the aircraft en route.

2-8 Note. — Use of the term "minimum fuel" indicates recognition by a pilot that his fuel supply has reached a state where, upon reaching destination, he cannot accept any undue delay. This is not an emergency situation but merely an advisory that indicates an emergency situation is possible should any undue delay occur. A minimum fuel advisory does not imply a need for traffic priority. Common sense and good judgment will determine the extent of assistance to be given in minimum fuel situations. If, at any time, the remaining usable fuel supply suggests the need for traffic priority to ensure a safe landing, the pilot should declare an emergency and report fuel remaining in minutes.

2-9 REPORTING ESSENTIAL FLIGHT INFORMATION

Report as soon as possible to the appropriate FSS, airport manager's office, ARTCC, approach control facility, operations office, or military operations office any information concerning components of the NAS or any flight conditions which may have an adverse effect on air safety.

2-9 Note. — FSS's are responsible for classifying and disseminating Notices to Airmen.

2-9 Reference. — Timely Information, 3-32. Order 7210.3 — 301, Periodic Maintenance. USN, see OPNAVINST 2112.2D.

2-10 NAVAID MALFUNCTIONS

When an aircraft reports a NAVAID malfunction, take the following actions:

2-10 Note. — The sequence of the actions are not intended to circumvent good judgment, should the circumstances so dictate.

2-10 Reference. — Order 7210.3 — 351, AT System Component Malfunctions.

a. Request a report from a second aircraft.

b. If the second aircraft reports normal operations, continue use, and inform the first aircraft. Record the incident on FAA Form 7230-4 or appropriate Military Form.

c. If the second aircraft confirms the malfunction or in the absence of a second aircraft report, activate the standby equipment or request the monitor facility to activate.

d. If normal operation is reported after the standby equipment is activated, continue use, record the incident on FAA Form 7230-4 or appropriate Military Form, and notify Airway Facilities (AF) personnel (the Systems Engineer of the ARTCC when an en route aid is involved).

e. If continued malfunction is reported after the standby equipment is activated or the standby equipment cannot be activated, inform AF personnel and request advice on whether or not the aid should be shut down. In the absence of a second aircraft report, advise the AF personnel of the time of the initial aircraft report and the estimated time a second aircraft report could be obtained.

2-11 USE OF MARSA

a. MARSA may only be applied to special military operations specified in a letter of agreement or other appropriate FAA or military document.

2-11a Note. — Application of MARSA is a military command prerogative. It will not be invoked indiscriminately by individual units or pilots. It will be used only for special IFR operations requiring its use. Commands authorizing MARSA will ensure that its implementation and terms of use are documented and coordinated with the control agency having jurisdiction over the area in which the operations are conducted. Terms of use will assign responsibility and provide for separation among participating aircraft.

b. ATC facilities do not invoke or deny MARSA. Their sole responsibility concerning the use of MARSA is to provide separation between military aircraft engaged in MARSA operations and other nonparticipating IFR aircraft.

c. DOD shall ensure that military pilots requesting special-use airspace/ATCAA's have coordinated with the scheduling agency, have obtained approval for entry, and are familiar with the appropriate MARSA procedures. ATC is not responsible for determining which military aircraft are authorized to enter special-use airspace/ATCAA's.

2-12 MILITARY PROCEDURES

Military procedures in the form of additions, modifications, and exceptions to the basic FAA procedure are prescribed herein when a common procedure has not been attained or to fulfill a specific requirement. They shall be applied by:

a. ATC facilities operated by that service.

2-12a Examples. —

An Air Force facility providing service for an Air Force Base would apply USAF procedures to all traffic regardless of class.

A Navy facility providing service for a Naval Air Station would apply USN procedures to all traffic regardless of class.

b. ATC facilities, regardless of their parent organization (FAA, USAF, USN, USA), supporting a designated military airport exclusively. This designation determines which military procedures are to be applied.

2-12b Examples. —

An FAA facility supports a USAF Base exclusively — USAF procedures are applied to all traffic at that base.

An FAA facility provides approach control service for a Naval Air Station as well as supporting a civil airport — Basic FAA procedures are applied at both locations by the FAA facility.

A USAF facility supports a USAF Base and provides approach control service to a satellite civilian airport — USAF procedures are applied at both locations by the USAF facility.

2-12b Reference. — Annotations, 1-23.

c. Other ATC facilities when specified in a letter of agreement.

2-12c Example. —

A USAF unit is using a civil airport supported by an FAA facility — USAF procedures will be applied as specified in a letter of agreement between the unit and the FAA facility to the aircraft of the USAF unit. Basic FAA procedures will be applied to all other aircraft.

2-13 FORMATION FLIGHTS

Control formation flights as a single aircraft. When individual control is requested, issue advisory information which will assist the pilots in attaining separation. When pilot reports indicate separation has been established, issue control instructions as required.

2-13 Note 1. — Separation responsibility between aircraft within the formation during transition to individual control rests with the pilots concerned until standard separation has been attained.

2-13 Note 2. — Formation join-up and breakaway will be conducted in VFR weather conditions unless prior authorization has been obtained from ATC or individual control has been approved.

2-13 Reference. — Additional Separation for Formation Flights, 5-74. Glossary (Formation Flight).

2-14 COORDINATE USE OF AIRSPACE

Do not allow an aircraft under your control to enter airspace delegated to another controller without first completing coordination.

2-15 CONTROL TRANSFER

a. Transfer control responsibility at a prescribed or coordinated location, time, fix, or altitude and only after eliminating any potential conflict with other aircraft for which you have separation responsibility.

2-15 Reference — Coordinate Use of Airspace, 2-14.

b. When you transfer control of an aircraft while it is within your area of jurisdiction, issue any instructions to the receiving controller that may be necessary to provide separation from other aircraft for which you have separation responsibility.

c. Assume control of an aircraft only after it is in your area of jurisdiction unless specifically coordinated or as specified by letter of agreement or a facility directive.

d. If you need to change an aircraft's heading, route, speed, or altitude within another controller's area of jurisdiction, coordinate such changes with that controller and, as required, any intervening controller through whose area the aircraft will pass prior to making the change.

2-16 AIRPORT TRAFFIC AREAS

a. Coordinate with the appropriate non-approach control tower on an individual aircraft basis before issuing a clearance which would require flight within an airport traffic area unless otherwise specified in a letter of agreement.

2-16a References. — Order 7210.3 — 430, Letters of Agreement. FAR 91.85, Operating on or in the Vicinity of an Airport. Glossary (Airport Traffic Area).

b. Coordinate with the appropriate control tower for transit authorization when you are providing radar traffic advisory service to an aircraft that will enter another facility's airport traffic area.

2-16b Note. — The pilot is not expected to obtain his own authorization through each area when in contact with a radar facility.

c. Transfer communications to the appropriate facility, if required, prior to operation within the airport traffic area.

2-16c References. — Radio Communications Transfer, 2-17. FAR 91.87, Operation at Airports with Operating Control Towers.

2-17 RADIO COMMUNICATIONS TRANSFER

a. Transfer radio communications before an aircraft enters the receiving controller's area of jurisdiction unless otherwise coordinated.

b. Transfer radio communications by specifying the following:

2-17b Note. — Radio communications transfer procedures may be specified by letter of agreement or contained in the route description of an MTR and as published in the DOD Planning AP/1B (AP/3).

(1) The facility name or location name and terminal function to be contacted. *TERMINAL:* Omit the location name when transferring communications to another controller within your facility except as required in 5-137.

(2) Frequency to use except the following may be omitted:

(a) FSS frequency.

(b) Departure frequency if previously given or published on a SID chart for the procedure issued.

(c) *TERMINAL:*

(i) Ground or local control frequency if in your opinion the pilot knows which frequency is in use.

(ii) The numbers preceding the decimal point if the ground control frequency is in the 121 MHz bandwidth.

2-17b Examples. —

"Contact tower."

"Contact ground."

"Contact ground point seven."

"Contact ground, one two zero point eight."

"Contact Huntington Radio."

"Contact departure."

"Contact Los Angeles Center, one two three point four."

(3) Time, fix, altitude, or specifically when to contact a facility. You may omit this when compliance is expected upon receipt.

2-17b(3) Note. — The AIM, paragraph 340, informs pilots that they are expected to maintain a listening watch on the transferring controller's frequency until the time, fix, or altitude specified.

Phraseology:

CONTACT (facility name or location name and terminal function), (frequency).

If required,

AT (time, fix, or altitude).

c. Avoid issuing a frequency change to helicopters known to be single piloted during air-taxiing, hovering, or low-level flight. Whenever possible, relay necessary control instructions until the pilot is able to change frequency.

2-17c Note. — Most light helicopters are flown by one pilot and require the constant use of both hands and feet to maintain control. Although flight control friction devices assist the pilot, changing frequency near the ground could result in inadvertent ground contact and consequent loss of control. Pilots are expected to advise ATC of their single pilot status if unable to comply with a frequency change.

2-17c. Reference. — AIM.

d. In situations where the controller does not want the pilot to change frequency but the pilot is expecting or may want a frequency change, use the following phraseology.

Phraseology:

REMAIN THIS FREQUENCY.

2-18 OPERATIONAL REQUESTS

Approve or disapprove a pilot's or vehicle operator's request as circumstances permit. In cases where specific phraseology is not set forth for the applicable procedure, use the following phraseology to approve or disapprove these requests.

Phraseology:

APPROVED AS REQUESTED.

(Requested operation) APPROVED.

UNABLE (requested operation).

When necessary,

(reason and/or additional instructions.)

2-19 WAKE TURBULENCE

a. Apply wake turbulence procedures to aircraft operating behind heavy jets and, where indicated, to small aircraft behind large aircraft.

2-19a Note.— Paragraph 5-72e specifies increased radar separation for small type aircraft landing behind large or heavy aircraft because of the possible effects of wake turbulence.

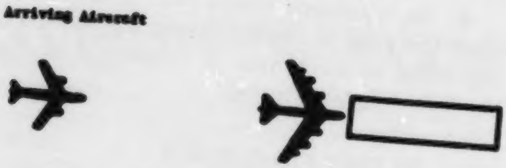
b. The separation minima shall continue to touchdown for all IFR aircraft not making a visual approach or maintaining visual separation.

c. *USAF:* Separate aircraft other than heavy jets operating behind an A-300, B-747, C-5A, DC-10, or L-1011 — *10 miles or 4 minutes.*

2-20 WAKE TURBULENCE CAUTIONARY ADVISORIES

a. Issue wake turbulence cautionary advisories and the position, altitude if known, and direction of flight of the heavy jets to: AC 90-23D, Pilot Responsibility, paragraph 12.

(1) *TERMINAL:* VFR aircraft not being radar vectored but are behind heavy jets.



2-20a(1) Illustration

(2) IFR aircraft that accept a visual approach or visual separation.

2-20a(2) Reference. — Visual Approach, 7-30.

(3) *TERMINAL:* VFR arriving aircraft that have previously been radar vectored and the vectoring has been discontinued.

b. Issue cautionary information to any aircraft if in your opinion wake turbulence may have an adverse effect on it. When traffic is known to be a heavy aircraft, include the word *heavy* in the description.

2-20b Note. — Wake turbulence may be encountered by aircraft in flight as well as when operating on the airport movement area. Because wake turbulence is unpredictable, the controller is not responsible for anticipating its existence or effect.

2-20b Reference. — Advisory Circular 90-23D. Glossary (Aircraft Classes and Wake Turbulence).

Phraseology:

CAUTION WAKE TURBULENCE (traffic information).

2-21 TRAFFIC ADVISORIES

Unless an aircraft is operating within the Positive Controlled Area or omission is requested by the pilot, issue traffic advisories to all aircraft (IFR or VFR) on your frequency when in your judgment their proximity may diminish to less than the applicable separation minima. Provide this service as follows:

a. To radar identified aircraft:

(1) Azimuth from aircraft in terms of the 12-hour clock, or

(2) When rapidly maneuvering civil test or military aircraft prevent accurate issuance of traf-

fic as in (1) above, specify the direction from an aircraft's position in terms of the eight cardinal compass points(N, NE, E, SE, S, SW, W, and NW). This method shall be terminated at the pilot's request.

(3) Distance from aircraft in miles.

(4) Direction in which traffic is proceeding and/or relative movement of traffic.

2-21a(4) Note. — Relative movement includes closing, converging, parallel same direction, opposite direction, diverging, overtaking, crossing left to right, crossing right to left.

(5) If known, type of aircraft and altitude.

2-21a(5) Reference. — Description of Aircraft Types, 2-87.

(6) If Mode C altitude readout is not verified, state the word "unverified" after the altitude.

2-21a(6) Note. — In a radar environment, altitude information will be ascertained by either a report or verified Mode C. Altitude readout which is unverified may still be helpful provided the pilot knows it is not verified.

Phraseology:

TRAFFIC, (number) O'CLOCK *or, when appropriate,* (direction, (number) MILES, (direction)-BOUND *and/or* (relative movement), *and if known,* (type of aircraft and altitude).

If altitude is unknown,

ALTITUDE UNKNOWN.

If altitude is unverified Mode C,

(altitude) UNVERIFIED.

2-21a Examples. —

"Traffic, eleven o'clock, one zero miles, southbound, converging, DC-8, one seven thousand."

"Traffic, twelve o'clock, one five miles, opposite direction, altitude unknown."

"Traffic, two o'clock, one zero miles, westbound, six thousand five hundred unverified."

"Traffic, northeast, five miles, southbound, one five thousand five hundred unverified."

"Traffic, numerous targets, vicinity of Delia Airport."

(7) When requested by the pilot, issue radar vectors to assist in avoiding the traffic, provided the aircraft to be vectored is within your area of jurisdiction or coordination has been effected with the sector/facility in whose area the aircraft is operating.

(8) If unable to provide vector service, inform the pilot.

2-21a(8) Reference. — Operational Requests, 2-18.

(9) If the pilot informs you he does not see the traffic you have issued, inform him when the traffic is no longer a factor.

Phraseology:

TRAFFIC NO LONGER A FACTOR,

or

(number) O'CLOCK TRAFFIC NO LONGER A FACTOR,

or

(direction) TRAFFIC NO LONGER A FACTOR.

b. To aircraft that are not radar identified:

(1) Distance and direction from fix.

(2) Direction in which traffic is proceeding.

(3) If known, type of aircraft and altitude.

(4) ETA over the fix the aircraft is approaching, if appropriate.

Phraseology:

TRAFFIC, (number) MILES/MINUTES (direction) OF (airport or fix), (direction)-BOUND, *and if known,* (type of aircraft and altitude), ESTIMATED (fix) (time),

or

TRAFFIC, NUMEROUS TARGETS VICINITY (location).

If altitude is unknown,

ALTITUDE UNKNOWN.

2-21b Examples. —

"Traffic, one zero miles east of Forsythe V-O-R, southbound, DC-8, descending to one six thousand."

"Traffic, reported one zero miles west of Downey V-O-R, northbound, Apache, altitude unknown, estimated Joliet V-O-R one three one five."

"Traffic, eight minutes west of Chicago Heights V-O-R, westbound, Mooney, eight thousand, estimated Joliet V-O-R two zero three five."

2-22 BIRD ACTIVITY INFORMATION

a. Issue advisory information on pilot-reported, tower-observed, or radar-observed and pilot-verified bird activity. Include position, species or size of birds, if known, course of flight, and altitude. Do this for at least 15 minutes after receipt of such information from pilots or from adjacent facilities unless visual observation or subsequent reports reveal the activity is no longer a factor.

Phraseology:

FLOCK OF (species, if known) (size, if known) BIRDS, (number) O'CLOCK (number) MILES (direction)-BOUND, LAST REPORTED AT (altitude, as determined from pilot report),

or

ALTITUDE UNKNOWN.

FLOCK OF (species, if known) (size, if known) BIRDS (direction)-BOUND ALONG (flyway or geographical route), LAST REPORTED AT (altitude, as determined from pilot report),

or

ALTITUDE UNKNOWN.

FLOCK OF/NUMEROUS FLOCKS (species, if known)/(size, if known) BIRDS, VICINITY (location), LAST REPORTED AT (altitude, as determined from pilot report),

or

ALTITUDE UNKNOWN.

2-22a. Examples. —

"Flock of geese, one o'clock, seven miles, northbound, last reported at four thousand."

"Flock of small birds, southbound along Mohawk River, last reported at three thousand."

"Numerous flocks of ducks, vicinity Lake Winnebago, altitude unknown."

b. Relay bird activity information to adjacent facilities and to FSS's whenever it appears it will become a factor in their areas.

2-23 TRANSFER OF POSITION RESPONSIBILITY

The transfer of position responsibility shall be accomplished in accordance with the "Standard Operating Practice (SOP) for the Transfer of Position Responsibility," and the appropriate facility directives each time the operational responsibility for a position is transferred from one specialist to another.

2-24 thru 2-29 RESERVED

Section 2. FLIGHT PLANS AND CONTROL INFORMATION

2-30 RECORDING INFORMATION

a. Record domestic flight plans on flight plan forms or flight progress strips. Enter information required by the type of flight plan, existing circumstances, and future communications since all items are not necessary in each instance and not all entered will be transmitted when the flight plan is processed. Use authorized abbreviations when possible. When accepting flight plans for random RNAV routes, ensure that the route is defined by waypoints in terms of degree-distance fixes.

2-30a Note. — Generally, all military overseas flights are required to clear through a specified military base operations office (BASOPS). Pilots normally will not file flight plans directly with an FAA facility unless a BASOPS is not available. BASOPS will, in turn, forward the IFR flight notification message to the appropriate center.

b. When accepting flight plans for random routes that are defined by latitude/longitude coordinates, ensure that the route is identified by waypoints in terms of latitude/longitude fixes and departure/arrival fix identifiers. Latitude/longitude coordinates shall be recorded in degrees and minutes as follows: four figures describing latitude in degrees and minutes, followed by a solidus (/), and five figures describing longitude in degrees and minutes.

2-30b Example. —

"3559/11451"

c. *EN ROUTE:* When flight plans are filed directly with the center, record all items given by the pilot either on a flight progress strip or on a voice recorder. If the latter, enter in box 26 of the initial flight progress strip the sector or position number to identify where the information may be found in the event SAR activities become necessary.

2-31 FORWARDING INFORMATION

a. Except during Stage A operation, forward the flight plan information to the appropriate ATC facility, FSS, or BASOPS and record the time of filing and delivery on the form.

b. *EN ROUTE:* During Stage A operations, the above manual actions are required in cases where the data is not forwarded automatically by the computer.

2-31b Note.— During Stage A operation, data are exchanged between interfaced automated facilities and both the data and time of transmission are recorded automatically.

c. *EN ROUTE:* Forward proposed tower en route flight plans and any related amendments to the appropriate departure terminal facility.

2-32 FORWARDING VFR DATA

TERMINAL

Forward aircraft departure times to FSS's or military operations offices when they have requested them. Forward other VFR flight plan data only if requested by the pilot.

2-33 MILITARY DVFR DEPARTURES

TERMINAL

Forward departure times on all military DVFR departures from joint-use airports to the military operations office.

2-33 Note 1. — Details for handling air carrier, nonscheduled civil, and military DVFR flight data are contained in 7610.4.

2-33 Note 2. — Military pilots departing DVFR from a joint-use airport will include the phrase "DVFR to (destination)" in their initial call-up to an FAA operated tower.

2-34 IFR TO VFR FLIGHT PLAN CHANGE

Request a pilot to contact the appropriate FSS if he informs you of a desire to change from an IFR to a VFR flight plan.

2-35 IFR FLIGHT PROGRESS DATA

Forward control information from controller to controller within a facility, then to the receiving facility as the aircraft progresses along its route. Where appropriate, use computer equipment in lieu of manual coordination procedures. Ensure that flight plan and control information is correct and up-to-date. When covered by a letter of agreement/facility directive, the time requirements of a. may be reduced, and the time requirements of b(1) and 2-41a. may be increased up to 15 minutes when facilitated by automated systems or mandatory radar handoffs; or if operationally necessary because of manual data processing or nonradar operations, the time requirements of a. may be increased.

2-35 Note 1. — The procedures for preparing flight plan and control information related to altitude reservations (ALTRV's) are contained in Order 7210.3 — 1001. Development of the methods of assuring the accuracy and completeness of ALTRV flight plan and control information is the responsibility of the Military Liaison and Security Officer.

2-35 Note 2. — The term facility in this paragraph is defined as centers and terminal facilities when operating in an en route capacity.

a. Forward the following information at least 15 minutes before the aircraft is estimated to enter the receiving facility's area:

(1) Aircraft identification.

(2) Heavy aircraft indicator "H" (if appropriate), type of aircraft and appropriate suffix if transponder, DME, RNAV, or TACAN-only equipped.

(3) Assigned altitude and ETA over last reporting point/fix in transferring facility's area or assumed departure time when the departure point is the last point/fix in the transferring facility's area.

(4) Altitude at which aircraft will enter the receiving facility's area if other than the assigned altitude.

(5) True airspeed.

(6) Point of departure.

(7) Route of flight remaining.

(8) Destination airport and clearance limit if other than destination airport.

(9) ETA at destination airport (not required for military or scheduled air carrier aircraft).

(10) Altitude requested by the aircraft if assigned altitude differs from requested altitude (within a facility only).

2-35a(10) Note. — When an aircraft has crossed one facility's area and assignment at a different altitude is still desired, the pilot will reinitiate his request with the next facility.

2-35a(10) Reference. — Anticipated Altitude Changes, 4-46.

(11) When flight plan data must be forwarded manually and an aircraft has been assigned a beacon code by the computer, include the code as part of the flight plan.

(12) Longitudinal separation being used between aircraft at the same altitude if it results in these aircraft having less than 10 minutes separation at the facilities' boundary.

(13) Any additional non-routine operational information pertinent to flight safety.

2-35(13) Note. — *EN ROUTE:* This includes alerting the receiving controller that the flight is conducting celestial navigation training.

2-35a(13) Reference. — *EN ROUTE:* Celestial Navigation Training, 8-21.

b. Forward position report over last reporting point in the transferring facility's area if any of the following conditions exist:

(1) Time differs more than 3 minutes from estimate given.

(2) Requested by receiving facility.

(3) Agreed to between facilities.

2-36 MANUAL INPUT OF COMPUTER ASSIGNED BEACON CODES

When a flight plan is manually entered into the computer and a computer-assigned beacon code has been forwarded with the flight plan data, insert the beacon code in the appropriate field as part of the input message.

2-37 ALTRV INFORMATION

EN ROUTE

When an aircraft is a part of an approved ALTRV, forward only those items necessary to properly identify the flight, update flight data contained in the ALTRV APVL, or revise previously given information.

2-38 COMPUTER MESSAGE VERIFICATION

EN ROUTE

Unless your facility is equipped to automatically obtain acknowledgment of receipt of transferred data, when you transfer control information by computer message obtain, via Service F, acknowledgment that the receiving center has received the message and verification of the following:

a. Within the time limits specified by a letter of agreement or when not covered by a letter of agreement, at least 15 minutes before the aircraft is estimated to enter the receiving facility's area or at the time of a radar handoff or coordination for transfer of control:

(1) Aircraft identification.

(2) Assigned altitude.

(3) Departure or coordination fix time.

b. Any cancellation of IFR flight plan.

2-39 TRANSMIT PROPOSED FLIGHT PLAN

EN ROUTE

a. Transmit proposed flight plans which fall within an ARTCC's Proposed Boundary Crossing Time (PBCT) parameter to adjacent ARTCC's via the Computer B network during hours of intercenter computer operation. In addition, when the route of flight of any proposed flight plan exceeds 20 elements external to the originating ARTCC's area, Center B shall be used to forward the data to all affected centers.

b. During nonautomated operation, the proposed flight plans shall be sent via Center B to the other centers involved when any of the following conditions are met:

(1) The route of flight external to the originating center's area consists of 10 or more elements and the flight will enter 3 or more other center areas.

2-39b(1) Note. — An element is defined as either a fix or route as specified in Order 7110.80-156.

(2) The route of flight beyond the first exit from the originating center's area consists of 10 or more elements, which are primarily fixes described in fix-radial-distance or latitude/longitude format, regardless of the number of other center areas entered.

(3) The flight plan remarks are too lengthy for interphone transmission.

2-40 FORWARDING AMENDED AND UTM DATA

a. Forward any amending data concerning previously forwarded flight plans except that revisions to ETA information in 2-35a(3). need only be forwarded when the time differs by more than 3 minutes from the estimate given.

Phraseology:

(Identification), REVISED (revised information).

2-40a. Examples. —

"American Two, revised flight level, three three zero."

"United Eight Ten, revised estimate, Front Royal two zero zero five."

"Douglas Five Zero One Romeo, revised altitude, eight thousand."

"Eastern Four Thirty-six, revised type, heavy DC-8."

b. Computer acceptance of an appropriate input message fulfills the requirement for sending amended data. The amendment data are considered acknowledged upon receipt of a CRD update message or a computer-generated flight progress strip containing the amendment data.

2-40b. Note 1. — The successful utilization of automation equipment requires timely and accurate insertion of changes and/or new data.

2-40b. Note 2. — If a pilot is not issued a computer generated PDR/PDAR/PAR and amendment data are not entered into the computer, the next controller will have incorrect route information.

c. Forward any amending control information and record the action on the appropriate flight progress strip.

d. *EN ROUTE:* During Stage A operation, effect manual coordination on an initial interfacility flight plan message and on any subsequent messages related to that flight plan under the following conditions:

(1) When a red coordination indicator is printed on the coordination strip.

(2) When a black coordination indicator is printed on the coordination strip and an Unsuccessful Transmission Message (UTM) referencing that flight plan is received at the coordination sector. Draw a line through the computer coordination indicator and indicate when manual coordination has been effected.

(3) When the transmission of the initial flight plan message is successful and a UTM is received containing revised data.

2-41 AIRBORNE MILITARY FLIGHTS

Forward to FSS's the following information received from airborne military aircraft:

a. IFR flight plans.

b. Changes to an IFR flight plan as follows:

(1) Change in destination.

(2) Revised ETA.

(3) Change in fuel exhaustion time.

2-41 Note. — This makes current information available to FSS's for relay to military bases concerned and for use by centers in the event of two-way radio communication failure.

2-42 FORWARDING FLIGHT PLAN DATA BETWEEN U.S. ARTCC'S AND CANADIAN ACC'S

EN ROUTE

a. *Domestic*— (Continental U.S./Canadian Airspace except Alaska) Proposed departure flight plans and en route estimates will be handled on a 30 minute lead time (or as bilaterally agreed) between any ACC or ARTCC.

b. *International*— Any route changes (except SID's) must be forwarded to the appropriate Oceanic/Pre-oceanic ACC or ARTCC with an optimum lead time of 30 minutes or as soon as this information becomes available.

c. Intially, if a flight goes from U.S. airspace into Canadian airspace and returns to U.S. airspace, the ACC will be responsible for forwarding the flight plan data to the appropriate ARTCC by voice transmission except for flights which traverse mutually agreed on airways/fixes. These airways/fixes will be determined on a case-by-case basis and will be based on time and distance considerations at the regional level.

2-43 TELETYPE FLIGHT DATA FORMAT — U.S. ARTCC's — CANADIAN ACC's

EN ROUTE

The exchange of flight plan data between Canadian ACC's and U.S. ARTCC's shall be made as follows:

a. The U.S. ARTCC will transmit flight data to the Canadian ACC's in one of the following formats:

(1) FAA Service B Teletypewriter input format as described in the NAS Management Directives (MD's) for:

(a) Flight Plan Messages:

(i) Active

(ii) Proposed.

(b) Amendment Messages.

(c) Cancellation Messages.

(d) Response Messages to Canadian Input:

(i) Acknowledgment Messages.

(ii) Error Messages.

(iii) Rejection Messages.

(2) Canadian Ministry of Transport ACC Flight Strip Format: Where the data to be printed on the ACC strip form exceeds the strip form field size, the FAA Service B Teletypewriter input format in (1) above will be used. Input sequentially fields (1) through (8).

b. The Ministry of Transport ACC's will transmit flight data to the FAA ARTCC's in the following format:

(1) FAA Service B Teletypewriter input format as described in NAS MD's for:

(a) Flight Plan Messages:

(i) Active.

(ii) Proposed.

(b) Amendment Messages.

(c) Cancellation Messages.

(d) Correction Messages.

2-44 thru 2-49 RESERVED

Section 3. FLIGHT PROGRESS STRIPS

2-50 GENERAL

Use flight progress strips to post current data on air traffic and clearances required for control and other air traffic control services. To prevent misinterpretation when data is hand printed use standard hand-printed characters.

2-50 Note. — Unused flight progress strips, made available because of the design of strip printers whereby several blank strips are ejected to reach the first printed strip, should be saved and used for manual strip preparation.

a. Enter on the appropriate strip without delay the estimated times, clearance information, position reports, and any other IFR flight data received over any communications channel.

b. Maintain only necessary current data and remove the strips from the flight progress boards when no longer required for control purposes. To correct, update, or preplan information:

(1) Do not erase or overwrite any item. Use an "X" to delete a climb/descend and maintain arrow, an at or above/below symbol, a cruise symbol, and unwanted altitude information. Write the new altitude information immediately adjacent to it and within the same space. For other items, draw a horizontal line through it, and write the new item immediately adjacent to it and within the same space.

(2) Do not draw a horizontal line through an altitude being vacated until after the aircraft has reported or is observed (valid Mode C) leaving the altitude.

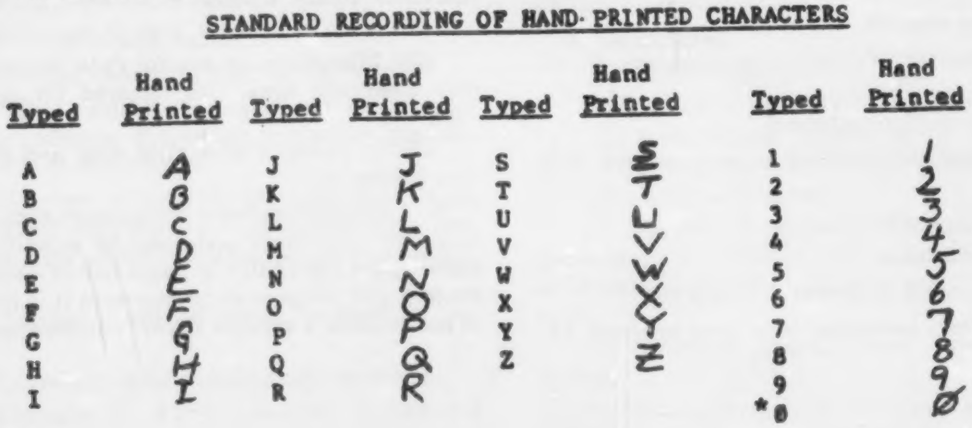
(3) *EN ROUTE:* Preplanning may be accomplished in red pencil.

c. Enter the time of arrival (at approach control locations, the time over release point) for aircraft landing within your sector jurisdiction as follows:

(1) *EN ROUTE:* Within controlled airspace — On the appropriate fix strip.

(2) *EN ROUTE:* Outside of controlled airspace but within flight advisory area — On the strip of the fix nearest the point of landing.

d. Manually prepared strips shall conform to the format of machine-generated strips and manual strip preparation procedures will be modified simultaneously with the operational implementation of changes in the machine-generated format.



STANDARD RECORDING OF HAND-PRINTED CHARACTERS

Typed	Hand Printed	Typed	Hand Printed	Typed	Hand Printed	Typed	Hand Printed
A	A	J	J	S	S	1	1
B	B	K	K	T	T	2	2
C	C	L	L	U	U	3	3
D	D	M	M	V	V	4	4
E	E	N	N	W	W	5	5
F	F	O	O	X	X	6	6
G	G	P	P	Y	Y	7	7
H	H	Q	Q	Z	Z	8	8
I	I	R	R			9	9
						*0	0

* The slant line cross through the numeral zero and the underline of the letter "S" on handwritten portion of the flight progress strips are required only when there is reason to believe the lack of these markings could lead to a misunderstanding. The slant line cross through the numeral zero is required on weather data.

2-50 Illustration

2-51 ARRANGEMENT OF POSTINGS

EN ROUTE

Arrange flight progress strips under the appropriate fix designators in the following manner:

a. Post in the appropriate low or high altitude sector according to the assigned altitude or flight level.

b. Sequence in chronological order of arrival over a particular fix (time sequencing) or in ascending order of assigned altitudes over a holding fix (altitude sequencing).

c. Post arrival aircraft in time sequence below the departure aircraft when displayed under the same fix designator, or sequence arrivals and departures together if considered more appropriate for a given fix. Arrival aircraft and departure aircraft may be displayed in two different bays.

2-52 DATA ENTRIES

EN ROUTE

a. Enter the information specified below in the correspondingly numbered spaces of the flight progress strips (FAA Form 7230-19):

(1) Verification symbol, if required.

(2) Revision number.

(3) Aircraft identification.

(4) Number of aircraft (if more than one), heavy aircraft indicator "H/" (if appropriate), type of aircraft, and special equipment indicators.

(5) Filed true airspeed.

(6) Sector number.

(7) Computer identification number, if required.

(8) Estimated groundspeed.

(9) Revised groundspeed or strip request (SR) originator.

(10) Strip number.

(11) Previous fix.

(12) Estimated time over previous fix.

(13) Revised estimated time over previous fix.

(14) Actual time over previous fix or actual departure time entered on first fix posting after departure.

(14a) Plus time expressed in minutes from the previous fix to the posted fix.

(15) Center - estimated time over fix (in hours and minutes) or clearance information for departing aircraft.

(16) Arrows to indicate if aircraft is departing (↑) or arriving (↓).

(17) Pilot - estimated time over fix.

(18) Actual time over fix, time leaving holding fix, arrival time at nonapproach control airport, or symbol indicating cancellation of IFR flight plan for arriving aircraft, or departure time (actual or assumed).

(19) Fix. For departing aircraft, add proposed departure time.

(20) Altitude (in hundreds of feet) information.

(21) Next posted fix or coordination fix.

(22) Pilot's estimated time over next fix.

(23) Arrows to indicate north (↑), south (↓), east (→), or west (←) direction of flight, if required.

(24) Requested altitude.

(25) Point of origin, route as required for control and data relay, and destination.

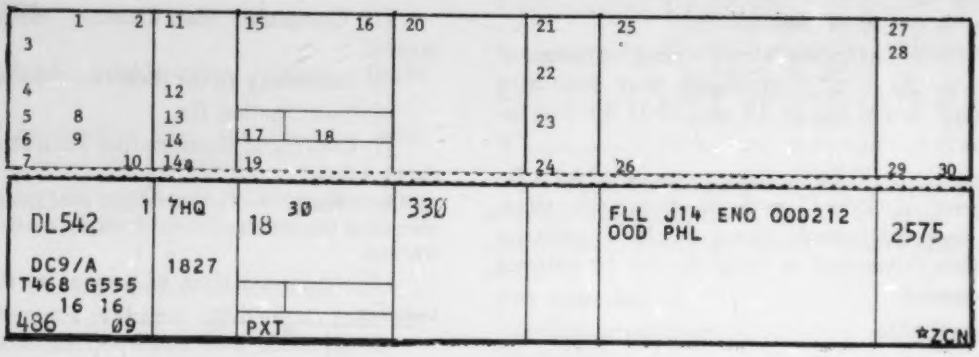
(26) Pertinent remarks, point out/radar vector/speed adjustment information or sector/position number (when applicable in accordance with 2-30c.). Facility chiefs may authorize the optional use of spaces 13, 14, 14a, 22, 23, 24, or 28 for point out/radar vector or speed adjustment information.

(27) Mode 3/A beacon code (if applicable).

(28) Miscellaneous control data (expected further clearance time, time cleared for approach, etc.).

(29-30) Transfer of control data and coordination indicators.

b. Latitude/longitude coordinates may be used to define waypoints and may be substituted for nonadapted NAVAID's in space (25) of domestic en route flight progress strips provided it is necessary to accomodate a random RNAV route request.



2-52 Illustration

2-53 DATA ENTRIES

TERMINAL

Enter the information specified below in the correspondingly numbered spaces of the flight progress strips (FAA Forms 7230-7.1, 7230-7.2, and 7230-8):

2-53 Note 1. — National standardization of items (10 through 18) is not practical because of regional and local variations in operating methods; e.g., single fix, multiple fix, radar, tower en route control, etc.

2-53 Note 2. — Air traffic managers at FDEP locations may authorize reduced lateral spacing between fields so as to print all FDEP data to the left of the strip perforation when using FAA Form 7230-7.2. All items will retain the same relationship to each other as they do when the full length strip (FAA Form 7230-7.1) is used.

a. Arrivals:

(1) Aircraft identification.

(2) Revision number (FDEP locations only).

(2A) Strip request originator. (At FDEP locations this indicates the sector or position that requested a strip be printed.)

(3) Number of aircraft (if more than one), heavy aircraft indicator "H/" (if appropriate), type of aircraft, and suffix indicating any special equipment.

(4) Computer identification number, if required.

(5) Secondary radar (beacon) code assigned.

(6) Previous fix (FDEP locations) or inbound airway.

2-53a(6) Note. — The previous fix will be printed at FDEP locations. Use of the inbound airway is restricted to facilities where flight data is received via interphone when agreed upon by the center and terminal facilities.

(7) Coordination fix.

(8) Estimated time of arrival at the coordination fix or destination airport.

(9) Altitude (in hundreds of feet) and remarks.

(9A) Destination airport/point out/radar vector/speed adjustment information. Air traffic managers may authorize the omission of any of these items if no misunderstanding will result, and they may authorize the optional use of spaces 2A and 10-18 for point out/radar vector or speed adjustment information.

2-53a(9A) Note. — Air traffic managers may permit this information to be omitted if no misunderstanding will result. This shall be specified in the facility directive concerning strip marking procedures.

(10 through 18) Enter data as specified by a facility directive. Radar facility personnel need not enter data in these spaces except when nonradar procedures are used or when radio recording equipment is inoperative.

b. Departures:

(1) Aircraft identification.

(2) Revision number (FDEP locations only).

(2A) Strip request originator. (At FDEP locations this indicates the sector or position that requested a strip be printed.)

(3) Number of aircraft (if more than one), heavy aircraft indicator "H/" (if appropriate), type of aircraft, and suffix indicating any special equipment.

(4) Computer identification number, if required.

(5) Secondary radar (beacon) code assigned.

(6) Proposed departure time.

(7) Requested altitude.

(8) Departure airport.

2-53b(6, 7, and 8) Reference. — See 2-53a(9A) Note.

(9) Machine generated — Route, destination, and remarks. Manually enter altitude/altitude restrictions in the order flown, if appropriate.

Manually prepared — Clearance limit, route, altitude/altitude restrictions in the order flown, if appropriate, and remarks.

(9A) Point out/radar vector/speed adjustment information. Air traffic managers may authorize the optional use of spaces 2A and 10-18 for this information.

(10 through 18) Enter data as specified by a facility directive. Items, such as departure time, runway used for takeoff, check marks to indicate information forwarded or relayed, may be entered in these spaces.

c. Overflights:

(1) Aircraft identification.

(2) Revision number (FDEP locations only).

(2A) Strip request originator. (At FDEP locations this indicates the sector or position that requested a strip be printed.)

(3) Number of aircraft (if more than one), heavy aircraft indicator "H/" (if appropriate), type of aircraft, and suffix indicating any special equipment.

(4) Computer identification number, if required.

(5) Secondary radar (beacon) code assigned.

(6) Coordination fix.

(7) Overflight coordination indicator (FDEP locations only).

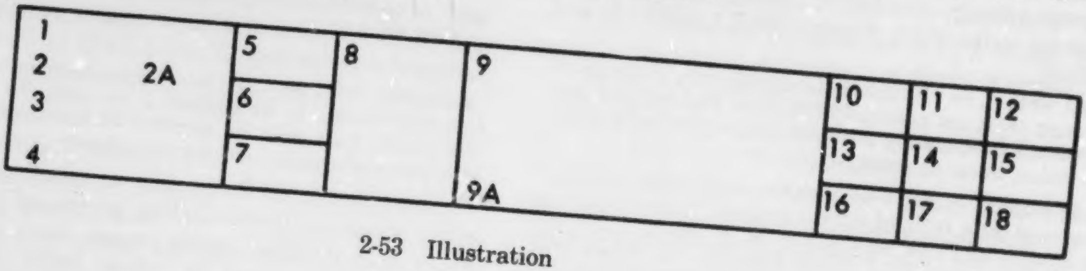
2-53c(7) Note. — The overflight coordination indicator identifies the facility to which flight data has been forwarded.

(8) Estimated time of arrival at the coordination fix.

(9) Altitude and route of flight through the terminal area.

(9A) Point out/radar vector/speed adjustment information. Air traffic managers may authorize the optional use of spaces 2A and 10-18 for this information.

(10 through 18) Enter data as specified by a facility directive.



2-53 Illustration

2-54 AIRCRAFT IDENTITY

Indicate aircraft identity by one of the following using combinations not to exceed seven alphanumeric characters:

a. Civil aircraft, including air carrier — Aircraft letter — digit registration number including the letter "T" prefix for air taxi aircraft, the letter "L" for lifeguard aircraft, or the 2- or 3- letter aircraft company designator specified in the Contractions Handbook, followed by the trip or flight number. Use the operating air carrier's company name in identifying equipment interchange flights.

2-54a Examples. —

"N12345." "TN5552Q." "AA192." "LN751B."

b. Military —

(1) Prefixes indicating branch of service and/or type of mission followed by the last 5 digits of the serial number (last 4 digits for CAF/CAM/CTG).

2-54b(1) Table. — Branch of Service Prefix

Prefix	*Branch*
A	U.S. Air Force
C	U.S. Coast Guard
G	Air or Army National Guard
VM	U.S. Marine Corps
R	U.S. Army
VV	U. S. Navy
CAF	Canadian Armed Force
CAM	Canadian Armed Force (Transport Command)
CTG	Canadian Coast Guard

2-54b(1) Table. — Military Mission Prefix

Prefix	*Mission*
E	Medical Air Evacuation
L	LOGAIR (USAF Contract)
S	Special Air Mission
M	MAC (Military Airlift Command)
F	Flight Check

(2) Pronounceable words of 3, 4, 5, and 6 letters followed by a 4-, 3-, 2-, or 1-digit number.

2-54b(2) Example. —
"SAMP 316."

(3) Assigned double-letter 2-digit flight number.

(4) Navy or Marine fleet and training command aircraft, one of the following:

(a) The service prefix and 2 letters (use phonetic alphabet equivalent), followed by 2 or 3 digits.

(b) The service prefix and a digit and a letter (use phonetic alphabet equivalent) followed by 2 or 3 digits.

c. Special-use — Approved special-use identifiers.

2-55 AIRCRAFT TYPE

Use the approved codes listed in the Contractions Handbook to indicate aircraft type.

2-56 USAF/USN UNDERGRADUATE PILOTS

To identify aircraft piloted by solo USAF/USN undergraduate student pilots (who may occasionally request revised clearances because they normally are restricted to flight in VFR conditions), the aircraft identification in the flight plan shall include the letter "Z" as a suffix. Do not use this suffix, however, in ground-to-air communication.

2-56 Note. — USAF solo students who have passed an instrument certification check may penetrate cloud layers in climb or descent only. Requests for revised clearances to avoid clouds in level flight can still be expected. This does not change the requirement to use the letter "Z" as a suffix to the aircraft identification.

2-56 Reference. — Order 7610.4, Part 11, Chapter 34.

2-57 AIRCRAFT EQUIPMENT SUFFIX

a. Indicate, for both VFR and IFR operations, the aircraft's radar transponder, DME, or RNAV capability by adding the appropriate symbol, preceded by a slant as follows:

/X	No Transponder.
/T	Transponder with no altitude encoding capability.
/U	Transponder with altitude encoding capability.
/D	DME, no transponder.
/B	DME, transponder with no altitude encoding capability.
/A	DME, transponder with altitude encoding capability
/M	TACAN-only, no transponder.
/N	TACAN-only, transponder with no altitude capability.
/P	TACAN-only, transponder with altitude encoding capability.
/C	RNAV, transponder with no altitude encoding capability.
/R	RNAV, transponder with altitude encoding capability.
/W	RNAV and no transponder.

b. When forwarding this information, state the aircraft type followed by the word "slant" and the appropriate phonetic letter equivalent of the suffix.

2-57 Examples. —
"D-C six slant tango."
"F-four-C slant november."
"F-eight-E slant papa."
"Seven-oh-seven slant foxtrot."

2-58 CLEARANCE STATUS

Use an appropriate clearance symbol followed by a dash (—) and other pertinent information to clearly show the clearance status of an aircraft. To indicate delay status use:

a. The symbol "H" at the clearance limit when holding instructions have been included in the aircraft's original clearance. Show detailed holding information following the dash when holding differs from the established pattern for the fix; i.e., turns, leg lengths, etc.

b. The symbols "F" or "O" to indicate the clearance limit when a delay is not anticipated.

2-59 CONTROL SYMBOLOGY

Use authorized control and clearance symbols or abbreviations for recording clearances, reports, and instructions. Control status of aircraft must always be current. You may use:

a. Plain language markings when it will aid in understanding information.

b. Locally approved identifiers. Use these only within your facility and not on teletypewriter or interphone circuits.

c. Plain sheets of paper to record information when flight progress strips are not used.

2-59 Table 1 — Clearance Abbreviations

Abbreviation	Meaning
A	Cleared to airport (point of intended landing)
B	Center clearance delivered
C	ATC clears (when clearance relayed through non-ATC facility)
CAF	Cleared as filed
D	Cleared to depart from the fix
F	Cleared to the fix
H	Cleared to hold and instructions issued

Abbreviation	Meaning
L	Cleared to land
N	Clearance not delivered
O	Cleared to the outer marker
PD	Cleared to climb/descend at pilot's discretion
Q	Cleared to fly specified sectors of a NAVAID defined in terms of courses, bearings, radials or quadrants within a designated radius.
T	Cleared through (for landing and takeoff through intermediate point)
V	Cleared over the fix
X	Cleared to cross (airway, route, radial) at (point)
Z	Tower jurisdiction

2-59 Table 2 — Miscellaneous Abbreviations

Abbreviation	Meaning
BC	Back course approach
CT	Contact approach
I	Initial approach
FA	Final approach
MA	Missed approach
NDB	Nondirectional radio beacon approach
SI	Straight-in approach
TA	TACAN approach
TL	Turn left
TR	Turn right
VA	Visual approach
VR	VOR approach
ILS	ILS approach
OTP	VFR conditions-on-top
PT	Procedure turn
RX	Report crossing
RP	Report immediately upon passing (fix/altitude)
SA	Surveillance approach
PA	Precision approach

TABLE 3 Control Information Symbols

Symbol	*Meaning*
T→( )	Depart (direction, if specified)
↑	Climb and maintain
↓	Descend and maintain
→	Cruise
@	At
X	Cross
M̶	Maintain
$\overline{7}$	Join or intercept airway/jet route/ track or course
=	While in controlled airspace
△	While in control area
↘△	Enter control area
△↗	Out of control area
NW↘⊖ ⊖↗NE ⊖→ E	Cleared to enter, depart, or cleared through control zone. Indicate direction of flight by arrow and appropriate compass letter. Maintain Special VFR/IFR conditions (altitude, if appropriate), while in control zone.
250K	Aircraft requested to adjust speed to 250 knots.
−20K	Aircraft requested to reduce speed 20 knots.
+30K	Aircraft requested to increase speed 30 knots.
Ⓦ	Local Special VFR operations in the vicinity of (name) airport are authorized until (time). Maintain special VFR conditions (altitude, if appropriate).
>	Before
<	After or Past
$\underline{170}$ (red)	Inappropriate altitude/flight level for direction of flight. (Underline assigned altitude/flight level in red.)
/	Until
( )	Alternate instructions
$\overline{\underline{\text{Restriction}}}$	Restriction
↧	At or Below
↥	At or Above
—(Dash)	From—to (route, time, etc.)
(Alt)B(Alt)	Indicates a block altitude assignment. Altitudes are inclusive, and the first altitude shall be lower than the second. *Example:* 310B370
V<	Clearance void if aircraft not off ground by (time)
₵	Pilot cancelled flight plan
✓	*EN ROUTE:* Aircraft has reported at assigned altitude. *Example:* 80✓
✓	*TERMINAL:* Information forwarded (indicated information forwarded as required)
○ (red)	*EN ROUTE:* Information forwarded (Circle, in red, the time (minutes) and altitude when a flight plan or estimate is forwarded. Also circle, in red, revised information forwarded. Use this method in both inter-center and intra-center coordination)
㊿	Other than assigned altitude reported (circle reported altitude)
$\left\lvert\frac{10}{6}\right\rvert$	DME holding (use with mileages) (Upper figure indicates distance from station to DME fix, lower figure indicates length of holding pattern. In this example, the DME fix is 10 miles out with a 6 mile pattern indicated.)
$\overset{\frown}{\text{(Mi.) (dir.)}}$	DME arc of VORTAC or TACAN
C (Freq.)	Contact (facility) on (freq.), (time, fix, or altitude, if appropriate). Insert frequency only when it is other than standard.
R	Radar contact
R	*EN ROUTE:* Requested altitude (preceding altitude information)
R̸	Radar service terminated
$\xcancel{R}$	Radar contact lost
Ⓡ	Radar handoff (circle symbol when handoff completed)
RV	Radar vector
R$\xcancel{V}$	Pilot resumed own navigation
E (red)	EMERGENCY
W (red)	WARNING
P	Point out initiated. Indicate the appropriate facility, sector, or position. *Example:* PZFW.

NOTE.—The absence of an airway or route number between two fixes in the route of flight indicates "direct"; no symbol or abbreviation is required.

2-60 thru 2-69 RESERVED

Section 4. RADIO AND INTERPHONE COMMUNICATIONS

2-70 RADIO COMMUNICATIONS

Use radio frequencies for the special purposes for which they are intended. A single frequency may be used for more than one function except as follows:

TERMINAL: When combining positions in the tower, do not use ground control frequency for airborne communications.

2-70 Note. — Due to the limited number of frequencies assigned to towers for the ground control function, it is very likely that airborne use of a ground control frequency could cause interference to other towers or interference to your aircraft from another tower. When combining these functions, it is recommended combining them on local control. The ATIS may be used to specify the desired frequency.

2-71 MONITORING

Monitor interphones and assigned radio frequencies continuously.

2-71 Note. — Although all FAA facilities, including RAPCON's and RATCF's, are required to monitor all assigned frequencies continuously, USAF facilities may not monitor all unpublished discrete frequencies.

2-72 AUTHORIZED INTERRUPTIONS

As necessary, authorize a pilot to interrupt his communications guard.

2-72 Note. — Some users have adopted procedures to insure uninterrupted receiving capability with ATC when a pilot with only one operative communications radio must interrupt his communications guard because of a safety related problem requiring airborne communications with his company. In this event, pilots will request approval to abandon guard on the assigned ATC frequency for a mutually agreeable time period. Additionally, they will inform controllers of the NAVAID voice facility and the company frequency they will monitor.

2-73 AUTHORIZED TRANSMISSIONS

Transmit only those messages necessary for air traffic control or otherwise contributing to air safety.

2-73 Reference. — Order 7210.3 — 321.

2-74 AUTHORIZED RELAYS

a. Relay operational information to aircraft or aircraft operators as necessary. Do not agree to handle such messages on a regular basis. Give the source of any such message you relay.

b. Relay official FAA messages as required.

2-74b Note. — The FAA Administrator and Deputy Administrator will sometimes use code phrases to identify themselves in air-to-ground communications as follows:

a. Administrator — "Safe Air One."

b. Deputy Administrator — "Safe Air Two."

2-74b Example. —

"Miami Center, Jetstar One, this is Safe Air One, (message)".

c. Relay operational information to military aircraft flight planned to or operating on IR's.

2-75 RADIO MESSAGE FORMAT

Initiate radio communication with an aircraft by using the following format:

a. Initial callup:

(1) Identification of the aircraft being called.

(2) Identification of the calling unit.

(3) The type of message to follow when this will assist the pilot.

(4) The word "over" if required.

b. Replying to callup from aircraft:

(1) Identification of the aircraft initiating the callup.

(2) Identification of the replying unit.

(3) Transmit message.

(4) The word "over" if required.

c. Use the same format as for initial callup and reply after communication has been established except, after stating the identification of the calling or replying unit, state the message to be sent or acknowledge the message received.

d. Preface a clearance or instruction intended for a specific aircraft with the identification of that aircraft. *TERMINAL:* You may omit aircraft identification after initial callup when conducting the final portion of a radar approach.

2-76 ABBREVIATED TRANSMISSIONS

Transmissions may be abbreviated as follows:

a. Use the identification prefix and the last 3 digits or letters of the aircraft identification after communications have been established and the type of aircraft is known. Do not abbreviate similar sounding aircraft identifications or the identification of an air carrier or other civil aircraft having an FAA authorized call sign.

2-76a Reference. — Aircraft Identification, 2-86.

b. Omit the facility identification after communication has been established.

c. Transmit the message immediately after the callup (without waiting for the aircraft's reply) when the message is short and receipt is generally assured.

d. Omit the word "over" if the message obviously requires a reply.

2-77 INTERPHONE TRANSMISSION PRIORITIES

Give priority to interphone transmissions as follows:

a. First priority — Emergency messages including essential information on aircraft accidents or suspected accidents. After an actual emergency has passed, give a lower priority to messages relating to that accident.

b. Second priority — Clearances and control instructions.

c. Third priority — Movement and control messages using the following order of preference when possible:

(1) Progress reports.

(2) Departure or arrival reports.

(3) Flight plans.

d. Fourth priority — Movement messages on VFR aircraft.

2-78 PRIORITY INTERRUPTION

Use the words "emergency" or "control" for interrupting lower priority messages when you have an emergency or control message to transmit.

2-79 INTERPHONE MESSAGE FORMAT

Use the following format for interphone (override/handoff line) intra/interfacility communications:

a. The caller states the identification of the position being called followed by the position identification of the caller.

b. The receiver states the position identification followed by an acknowledgment of the call.

2-79b Note. — If operationally beneficial, a. and b. may be reversed.

c. The caller states the message.

d. The receiver states the response to the caller's message followed by the receiver's operating initials.

e. The caller states his or her operating initials.

2-79 Example 1. —

Caller — "Denver High, R Twenty-five."

Receiver — "Denver High."

Caller — "Request direct Denver for Eastern Three Twenty-eight."

Receiver — "Eastern Three Twenty-eight direct Denver approved. H.F."

Caller — "G.M."

2-79 Example 2. —

Receiver — "Denver High, go ahead override."

Caller — "R Twenty-five, request direct Denver for Eastern Three Twenty-eight."

Receiver — "Eastern Three Twenty-eight direct Denver approved. H.F."

Caller — "G.M."

2-80 INTERPHONE MESSAGE TERMINATION

Terminate interphone messages with your operating initials.

2-81 WORDS AND PHRASES

Use the words or phrases in radiotelephone and interphone communication as contained in the Glossary, Appendix A. The word "heavy" shall be used in inter/intra facility communications for heavy jet identification and in communications with heavy jet aircraft.

2-81 Example. —

"United Fifty-eight heavy."

2-81 Note. — Most airlines will use the word "heavy" following the company prefix and trip number when establishing communications or when changing frequencies within a terminal facility's area.

2-82 EMPHASIS FOR CLARITY

Emphasize appropriate digits, letters, or similar sounding words to aid in distinguishing between similar sounding aircraft identifications. Additionally:

a. Notify each pilot concerned when communicating with aircraft having similar sounding identifications.

2-82a Examples. — "United Thirty-one United, Miami Center, Eastern Thirty-one is also on this frequency, acknowledge." "Eastern Thirty-one Eastern, Miami Center, United Thirty-one is also on this frequency, acknowledge."

2-82a Reference. — Aircraft Identification, 2-86. Order 7210.3 — 210, Aircraft Identification Problems.

b. Identify the interphone voice line on which the call is being made when two or more such lines are collocated at the receiving operating position.

2-82b Examples. —

"Washington Center, Washington Approach on the 57 line." "Chicago Center, O'Hare Tower handoff on the Departure West line."

2-83 ICAO PHONETICS

Use the ICAO phonetic alphabet in the Table to clarify the individual letter, as necessary.

2-83 Table. — ICAO Phonetics

A — Alfa
B — Bravo
C — Charlie
D — Delta
E — Echo
F — Foxtrot
G — Golf
H — Hotel
I — India
J — Juliett
K — Kilo
L — Lima
M — Mike

N — November
O — Oscar
P — Papa
Q — Quebec
R — Romeo
S — Sierra
T — Tango
U — Uniform
V — Victor
W — Whiskey
X — X-ray
Y — Yankee
Z — Zulu

2-84 NUMBERS USAGE

State numbers as follows:

a. Serial numbers — The separate digits.

2-84a Examples. —

Number	*Statement*
11,495	"One one four niner five."
20,069	"Two zero zero six niner."

b. Altitudes or flight levels:

(1) Altitudes — The separate digits of the thousand plus the hundreds.

2-84b(1) Example. —

Altitude	*Statement*
17,900	"One seven thousand niner hundred."

(2) Flight levels — The words "flight level" followed by the separate digits of the flight level.

2-84b(2) Examples. —

Flight level	*Statement*
180	"Flight level one eight zero"
275	"Flight level two seven five."

(3) MDA/DH Altitudes — The separate digits of the MDA/DH altitude

2-84b (3) Examples. —

MDA/DH Altitude	*Statement*
1,320	"Published minimum descent altitude, one three two zero"
486	"Published decision height, four eight six"

c. Time:

(1) General time information — The 4 separate digits of the hour and minutes based on the 24-hour clock in terms of Greenwich Mean Time (GMT).

2-84c(1) Examples. —

Time (12 hr.)	*Time (24 hr.)*	*Statement*
1:15 a.m.	0115	"Zero one one five."
1:15 p.m.	1315	"One three one five."

(2) Upon request — The 4 separate digits of the hours and minutes in terms of GMT, followed by the local standard time equivalents.

2-84c(2) Example. —

Time	*Statement*
1430 PST (2230 GMT)	"Two two three zero Greenwich, one four three zero Pacific."

(3) Time check — The word "time" followed by the 4 separate digits of the hour and minutes, and nearest quarter minute.

2-84c(3) Example. —

Time	*Statement*
1415 ¾	"Time, one four one five and three-quarters."

(4) Abbreviated time — The separate digits of the minutes only.

2-84c(4) Examples. —

Time	*Statement*
1415	"One five."
1420	"Two zero."

d. Field elevation — The words "field elevation" followed by the separate digits of the elevation.

2-84d Examples. —

Elevation	*Statement*
17 feet	"Field elevation, one seven."
817 feet	"Field elevation, eight one seven."
2,817 feet	"Field elevation, two eight one seven."

e. The number "0," except where it appears in group form — The word "zero."

2-84e Example. —

"Field elevation one six zero."

f. Altimeter setting — The word "altimeter" followed by the separate digits of the altimeter setting.

2-84f Example. —

Setting	*Statement*
30.01	"Altimeter, three zero zero one."

g. Surface wind — The word "wind" followed by the separate digits of the indicated wind direction to the nearest 10-degree multiple, the word "at," and the separate digits of the indicated velocity in knots.

2-84g Examples. —

"Wind zero three zero at two five."

"Wind two seven zero at one five peak gusts three five."

h. Heading — The word "heading" followed by the 3 separate digits of the number of degrees, omitting the word "degrees." Use heading 360 degrees to indicate a north heading.

2-84h Examples.-

Heading	*Statement*
5 degrees	"Heading zero zero five."
30 degrees	"Heading zero three zero."
360 degrees	"Heading three six zero."

i. Radar beacon codes — The separate digits of the 4-digit code.

2-84i Examples. —

Code	*Statement*
1000	"One zero zero zero."
2100	"Two one zero zero."

j. Runways — The word "runway," followed by the separate digits of the runway designation. For a parallel runway, state the word "left," "right," or "center" if the letter "L," "R," or "C" is included in the designation.

2-84j Examples. —

Designation	*Statement*
3	"Runway Three."
8L	"Runway Eight Left."
27R	"Runway Two Seven Right."

k. Frequencies —

(1) The separate digits of the frequency, inserting the word "point" where the decimal point occurs. Omit digits after the second digit to the right of the decimal point. When the frequency is in the L/MF band, include the word "kiloHertz."

2-84k(1) Examples. —

Frequency		*Statement*
126.55	MHz	"One two six point five five."
369.0	MHz	"Three six niner point zero."
121.5	MHz	"One two one point five."
135.275	MHz	"One three five point two seven."
302	kHz	"Three zero two kiloHertz."

(2) *USAF/USN:* Local channelization numbers may be used in lieu of frequencies for locally based aircraft when local procedures are established to ensure that local aircraft and ATC facilities use the same channelization.

2-84k(2) Example. —

Frequency		*Statement*
275.8	MHz	"Local channel one six."

l. Speeds —

(1) The separate digits of the speed followed by "knots", except as required by 5-101, Methods (Speed Adjustment).

2-84l(1) Examples. —

Speed	*Statement*
250	"Two five zero knots."
190	"One niner zero knots."

(2) The separate digits of the mach number preceded by "mach."

2-84l(2) Examples. —

Mach Number	*Statement*
1.5	"Mach one point five."
0.64	"Mach point six four."
0.7	"Mach point seven."

m. Miles — The separate digits of the mileage followed by the word mile.

2-84m Examples. —

"Three zero mile arc east of Nottingham."

"Traffic, one o'clock, two five miles, northbound, DC-8, flight level two seven zero."

2-85 FACILITY IDENTIFICATION

Identify facilities as follows:

a. Airport traffic control towers — State the name of the facility followed by the word "tower." Where military and civil airports are located in the same general area and have similar names, state the name of the military service followed by the name of the military facility and the word "tower."

2-85a Examples. —

"Columbus Tower."

"Barksdale Tower."

"Navy Jacksonville Tower."

b. Air route traffic control centers — State the name of the facility followed by the word "center."

c. Approach control facilities, including RAPCON's, RATCF's, and ARAC's — State the name of the facility followed by the word "approach." Where military and civil facilities are located in the same general area and have similar names, state the name of the military service followed by the name of the military facility and the word "approach."

2-85c Examples. —

"Denver Approach."

"Griffiss Approach."

"Navy Jacksonville Approach."

d. Functions within a terminal facility — State the name of the facility followed by the name of the function.

2-85d Examples. —

"Boston Departure."

"La Guardia Clearance Delivery."

"O'Hare Ground."

e. When calling or replying on an interphone line which connects only 2 facilities, you may omit the facility name.

2-85e Example. —

"Bradford High, handoff."

f. FAA flight service stations — State the name of the station followed by the word "radio."

2-85f Example —

"Pittsburgh Radio."

g. Radar facilities having ASR or PAR but not providing approach control service — State the name of the facility, followed by the letters "G-C-A."

2-85g Examples. —

"Chanute G-C-A."

"Corpus Christi G-C-A."

"Davison G-C-A."

2-86 AIRCRAFT IDENTIFICATION

Identify aircraft as follows: use the full identification in reply to aircraft with similar sounding identifications. For other aircraft, the same identification may be used in reply that the pilot used in his initial callup except use the correct identification after communications have been established.

2-86 Reference. — Abbreviated Transmissions, 2-76.

a. Civil — State the aircraft type, the model, or the manufacturer's name, or if none of these are known, the numbers/letters of the aircraft registration.

2-86a Examples. —

"Jet Commander One Four Two Four."

"Douglas Three Zero Five Romeo."

"Bonanza One Two Three Four Tango."

"November One Two Three Four Golf."

2-86a Note. — The prefix "November" denotes a U.S. aircraft registry and should be used only if the aircraft type, model, or manufacturer's name is not known.

(1) Air carrier and other civil aircraft having FAA authorized call signs — State the call sign followed by the flight number in group form.

2-86a(1) Examples. —

"American Five Twenty-one."

"Commuter Six Eleven."

"General Motors Thirty-seven."

(2) If aircraft identification becomes a problem when the procedures specified in (1) are used, the call sign shall be restated after the flight number of the aircraft involved.

2-86a(2) Examples —

"American Five Twenty-one American."

"Commuter Six Eleven Commuter."

"General Motors Thirty-seven General Motors."

2-86a(2) Reference. — Order 7210.3 — 210, Aircraft Identification Problems.

(3) Air taxi and commercial operators not having FAA authorized call signs — State the prefix "TANGO" on initial contact, if used by the pilot, followed by the registration number. The prefix may be dropped in subsequent communications.

2-86a(3) Examples. —

"Tango Mooney Five Five Five Two Quebec."

"Tango One Two Three Four."

b. Civilian airborne ambulance — State the word "LIFEGUARD" followed by the type and the numbers/letters of the registration number.

2-86b Example. —

"LIFEGUARD Cessna Two Six Four Six."

c. U.S. military — State one of the following:

(1) The service name, followed by the word "copter," when appropriate, and the last 5 digits of the serial number.

2-86c(1) Examples. —

"Navy Five Six Seven One Three."

"Coast Guard Six One Three Two Seven."

"Air Guard One Three Five Eight Six"

"Army Copter Three Two One Seven Six."

2-86c(1) Note. — If aircraft identification becomes a problem, procedures in paragraph 2-86a(2) will apply.

(2) Special military operations — State one of the following followed by the last 5 digits of the serial number:

(a) Air evacuation flights — "AIR EVAC," "MARINE AIR EVAC," or "NAVY AIR EVAC."

2-86c(2)(a) Example. —

"AIR EVAC One Seven Six Five Two."

(b) Rescue flights — (Service name) "RESCUE."

2-86c(2)(b) Example. —

"Air Force RESCUE Six One Five Seven Niner."

(c) Military Airlift Command — "MAC."

2-86c(2)(c) Example. —

"MAC Seven Eight Five Six Two."

(d) Special Air Mission — "SAM."

2-86c(2)(d) Example. —

"SAM Niner One Five Six Two."

(e) USAF Contract Aircraft — "LOGAIR."

2-86c(2)(e) Example. —

"LOGAIR Seven Five Eight Two Six."

(3) Military tactical and training:

(a) U.S. Air Force, Air National Guard, Military District of Washington priority aircraft, and USAF civil disturbance aircraft — Pronounceable words of 3, 4, 5 or 6 letters followed by a 4, 3, 2, or 1-digit number.

2-86c(3)(a) Examples. —

"Paul Two Zero."

"Pat One Five Seven."

"Gaydog Four."

2-86c(3)(a) Note. — When the "Z" suffix described in paragraph 2-56 is added to identify aircraft piloted by USAF undergraduate pilots, the call sign will be limited to a combination of six characters.

(b) Navy or Marine fleet and training command aircraft — The service name and 2 letters, or a digit and a letter (use letter phonetic equivalents), followed by 2 or 3 digits.

2-86c(3)(b) Examples. —

"Navy Golf Alfa Two One."

"Marine Four Charlie Two Three Six."

(c) NORAD interceptors — An assigned double letter 2-digit flight number.

2-86c(3)(c) Example. — "Alfa Kilo One Five."

d. Foreign registry — State one of the following:

(1) Civil — The letters or digits of the aircraft registration or call sign.

2-86d(a) Example. —

"C-F-L-R-B."

(2) Air carrier — The abbreviated name of the operating company, followed by:

(a) The letters or digits of the registration or call sign.

2-86d(2)(a) Example. —

"Air France F-L-R-L-G."

(b) The flight number in group form.

2-86d(2)(b) Example. —

"Scandinavian Sixty-eight."

(3) Military — Except Canada, the name of the country and the military service followed by the separate digits or letters of the registration or call sign. Canadian Armed Force aircraft shall be identified by the word "Canforce" followed by the separate digits of the serial number, except that the Transport Command of the Canadian Armed Force shall be identified by the words "Canadian Military" and the Canadian Coast Guard shall be identified as "Canadian Coast Guard" followed by the separate digits of the serial number.

2-86d(3) Examples. —

"CANFORCE Five Six Two Seven."

"Brazilian Air Force Five Three Two Seven Six."

e. Presidential aircraft and Presidential family aircraft:

(1) When the President is aboard a military aircraft, state the name of the military service, followed by the word "One."

2-86e(1) Examples. —

"Air Force One." 'Army One." 'Marine One."

(2) When the President is aboard a civil aircraft, state the words "Executive One."

(3) When a member of the President's family is aboard any aircraft, if the U.S. Secret Service or the White House Staff determines it is necessary, state the words "Executive One Foxtrot."

f. Vice Presidential aircraft:

(1) When the Vice President is aboard a military aircraft, state the name of the military service, followed by the word "Two."

2-86f(1) Examples. —

"Air Force Two." "Army Two." "Marine Two."

(2) When the Vice President is aboard a civil aircraft, state the words "Executive Two."

(3) When a member of the Vice President's family is aboard any aircraft, if the U.S. Secret Service or the White House Staff determines it is necessary, state the words "Executive Two Foxtrot."

g. Other special flights:

(1) Department of Energy flights — State the letters "R-A-C" (use phonetic alphabet equivalents) followed by the last 4 separate digits of the aircraft registration number.

2-86g(1) Example. —

"Romeo Alfa Charlie One Six Five Three."

(2) Semiautomatic Flight Inspections — State the code name "SAFI" followed by the separate digits of the grid number as filed.

2-86g(2) Example. —

"Denver Center, SAFI Five Two Seven."

(3) Flight Inspection of Navigational Aids — State the call sign "FLIGHT CHECK" followed by the digits of the registration number.

2-86g(3) Example. —

"Flight Check Three Niner Six Five Four."

(4) USAF aircraft engaged in aerial samplimg missions — State the call sign "SAMP" followed by the last three digits of the serial number.

2-86g(4) Example. —

"SAMP Three One Six."

h. Use a pilot's name in identification of an aircraft only in special or emergency situations.

2-87 DESCRIPTION OF AIRCRAFT TYPES

Except as provided in d, describe aircraft as follows when issuing traffic information.

a. Military:

(1) Military designator, with numbers spoken in group form, or

2-87a(1) Examples. —

"F-Four." "B-Fifty-eight."

"Air Force bomber." "Navy fighter."

"Fighter." "Bomber."

(2) Service and type, or

(3) Type only if no confusion or misidentification is likely.

b. Air Carrier:

(1) Manufacturer's name or model.

(2) Add the company name or other identifying features when confusion or misidentification is likely.

2-87b Examples. —

"Lockheed Ten-eleven." "American Seven-oh-seven." "United Seven Thirty-seven."

2-87b Note. — *TERMINAL:* Pilots of "interchange" aircraft are expected to inform the tower on the first radio contact the name of the operating company and trip number followed by the company name, as displayed on the aircraft, and the aircraft type.

c. General Aviation and Air Taxi:

(1) Manufacturer's model, name, or designator.

(2) Add color when considered advantageous.

2-87c Examples. —

"Tri-Pacer." "PA Twenty-two."

"Cessna Three Ten." "Green Apache."

d. When issuing traffic information to aircraft following a heavy jet, specify the word "heavy" before the manufacturer's name and model.

2-87d Examples. —

"Heavy Lockheed Ten-eleven."

"Heavy Boeing Seven Forty-seven."

2-88 thru 2-89 RESERVED

Section 5. ROUTE AND NAVAID DESCRIPTION

2-90 AIRWAYS AND ROUTES.

Describe airways, routes, or jet routes as follows:

a. VOR/VORTAC/TACAN airways or jet routes — State the word "Victor" or the letter "J" followed by the number of the airway or route in group form. For RNAV routes add the word "Romeo."

2-90a Examples. —

"Victor Twelve."

"J Five Thirty-three."

"Victor Seven Ten Romeo."

"J Eight Thirty Romeo."

"Offset one zero miles right of J Eight Thirty Romeo."

b. VOR/VORTAC/TACAN alternate airways — State the word "Victor" followed by the number of the airway in group form and the alternate direction.

2-90b Example. —

"Victor Twelve South."

c. L/MF airways — State the color of the airway followed by the number in group form.

2-90c Example. —

"Blue Eighty-one."

d. North American Route — State the words "North American Route" followed by the number of the route in group form.

2-90d Example. —

"North American Route Fifty."

e. MTR's — State the letters followed by the number of the route in group form.

2-90e Example. —

"IR Five Thirty-one."

2-91 NAVAID TERMS

Describe radials, arcs, courses, bearings and quadrants of NAVAID's as follows:

a. VOR/VORTAC/TACAN NAVAID's — State the name of the NAVAID followed by the separate digits of the radial (omitting the word "degrees") and the word "radial."

2-91a Example. —

"Appleton zero five zero radial."

b. Arcs about VOR-DME/VORTAC/TACAN NAVAID's — State the distance in miles from the NAVAID followed by the words "mile arc," the direction from the NAVAID in terms of the 8 principal points of the compass, the word "of," and the name of the NAVAID.

2-91b Example. —

"One five mile arc southwest of Grantsville."

c. Quadrant within a radius of NAVAID — State direction from NAVAID in terms of the quadrant; e.g., NE, SE, SW, NW, followed by the distance in miles from the NAVAID.

2-91c Example. —

"Cleared to fly northeast quadrant of Phillipsburg VORTAC within four zero mile radius."

2-91c Reference. — Route Use 4-30h. Glossary (Quadrant).

d. Nondirectional beacons — State the course to or the bearing from the radio beacon, omitting the word "degree," followed by the words "course to" or "bearing from," the name of the radio beacon, and the words "radio beacon."

2-91d Example. —

"Three four zero bearing from Randolph Radio Beacon."

2-92 NAVAID FIXES

Describe fixes determined by reference to a radial/localizer and distance from a VOR-DME/VORTAC/TACAN/ILS-DME as follows:

a. When a fix is not named, state the name of the NAVAID followed by a specified radial/localizer and state the distance in miles followed by the phrase "mile fix".

2-92a Examples. —

"Appleton zero five zero radial three seven mile fix."

"Reno localizer back course 4 mile fix."

b. When a fix is named, state the name of the fix followed by the phrase "D-M-E fix" or "Waypoint" as appropriate.

2-92b Examples. —

"Shaum D-M-E fix."

"Shaum Waypoint."

c. Use specific terms to describe a fix. Do not use expressions such as "passing Victor Twelve" or "passing J Eleven."

2-92c Reference. — Fix Use, 4-5.

2-93 thru 2-99 RESERVED

Section 6. WEATHER INFORMATION

2-100 FAMILIARIZATION

Become familiar with pertinent weather information when coming on duty, and stay aware of current weather information needed to perform air traffic control duties.

2-101 SIGMET or CWA ALERT

a. Broadcast a SIGMET or CWA alert once on all frequencies, except emergency, when any part of the area described is within 150 miles of the airspace under your jurisdiction. The broadcast is not required if aircraft on your frequency/s will not be affected.

b. Terminal facilities have the option to limit the SIGMET or CWA broadcast as follows: local control and approach control positions may opt to broadcast SIGMET or CWA alerts only when any part of the area described is within 50 miles of the airspace under their jurisdiction.

c. Include the following information in SIGMET and CWA broadcasts:

(1) SIGMET or CWA number.

(2) The term "convective" when applicable.

(3) General description of the area affected.

(4) Brief description of the type of weather.

2-101c(4) Note. — The message should be brief but contain enough information to alert pilots to significant weather conditions along their route of flight and to enable them to decide whether they should contact an FSS for more detailed information.

Phraseology:

ATTENTION ALL AIRCRAFT, SIGMET/CONVECTIVE SIGMET/CENTER WEATHER ADVISORY (number). (Brief description of area affected and type of weather.)

2-101 Examples. —

"Attention all aircraft, SIGMET Delta Three. From Myton to Tuba City to Milford. Severe turbulence and severe clear icing below one zero thousand feet. Expected to continue beyond zero three zero zero Greenwich."

"Attention to all aircraft, Convective SIGMET Two Seven Eastern. From the vicinity of Elmira to Phillipsburg. Scattered embedded thunderstorms moving east at one zero knots. A few intense level five cells, maximum tops four five zero."

"Attention all aircraft, Kansas City Center Weather Advisory Zero Three. Numerous reports of moderate to severe icing 080-090, 30 mile radius of STL. Light or negative icing reported 040-120 remainder of Kansas City Center area."

2-102 PIREP INFORMATION

Significant PIREP information includes reports of strong frontal activity, squall lines, thunderstorms, light to severe icing, wind shear and turbulence (including clear air turbulence) of moderate or greater intensity, or other conditions pertinent to flight safety.

2-102 References. — Order 7210.3 — 820, Handling of SIGMET's and PIREP's; and 1220, SIGMET and PIREP Handling.

a. Solicit PIREP's when requested or when one of the following conditions exist or are forecast for your area of jurisdiction:

(1) Ceilings at or below 5,000 feet. These PIREP's shall include cloud base/top reports when feasible. *TERMINAL:* Ensure that at least one descent/climb-out PIREP, including cloud base/s, top/s, and other related phenomena, is obtained each hour when there is a ceiling at or below 5,000 feet.

2-102a(1) Reference. — Order 7110.84, Terminal Area Pilot Weather Reports (PIREP's).

(2) Visibility (surface or aloft) at or less than 5 miles.

(3) Thunderstorms and related phenomena.

(4) Turbulence of moderate degree or greater.

(5) Icing of light degree or greater.

(6) Wind shear.

(7) *TERMINAL:* Braking Action Advisories are in effect.

2-102a(7) References. — Braking Action Advisories, 3-34. Glossary (Braking Action Advisories).

b. Record with the PIREP's:

(1) Time

(2) Aircraft position.

(3) Type aircraft.

(4) Altitude.

c. Obtain PIREP's directly from the pilot, or if the PIREP has been requested by another facility, you may instruct the pilot to deliver it directly to that facility.

Phraseology:

REQUEST FLIGHT CONDITIONS. REQUEST FLIGHT CONDITIONS AT PRESENT POSITION,

or

OVER (fix),

or

ALONG PRESENT ROUTE,

or

BETWEEN (fix) and (fix).

d. Handle PIREP's as follows:

(1) Relay pertinent PIREP information to concerned aircraft in a timely manner.

(2) *EN ROUTE:* Relay all operationally significant PIREP's to the facility weather coordinator.

(3) *TERMINAL:* Relay all operationally significant PIREP's to:

(a) The appropriate intrafacility positions.

(b) The FSS serving the area in which the report was obtained.

2-102d(3) (b) Note. — The FSS is responsible for Service A teletypewriter dissemination.

(c) Other concerned terminal or en route ATC facilities, including non-FAA facilities.

2-103 WEATHER AND CHAFF SERVICES

a. Issue pertinent information on observed/reported weather or chaff areas. Provide radar navigational guidance and/or approve deviations around weather or chaff areas when requested by the pilot. Do not use the word "turbulence" in describing radar-derived weather.

(1) Issue weather and chaff information by defining the area of coverage in terms of azimuth (by referring to the 12-hour clock) and distance from the aircraft or by indicating the general width of the area and the area of coverage in terms of fixes or distance and direction from fixes.

(2) When a deviation cannot be approved as requested and the situation permits, suggest an alternative course of action.

b. In areas of significant weather, plan ahead and be prepared to suggest, upon pilot request, the use of alternative routes/altitudes.

2-103b Note. — Weather significant to the safety of aircraft includes such conditions as tornadoes, lines of thunderstorms, embedded thunderstorms, large hail, wind shear, moderate to extreme turbulence (including CAT), and light to severe icing.

c. Inform any tower for which you provide approach control services if you observe any weather echoes on radar which might affect their operations.

Phraseology:

WEATHER/CHAFF AREA BETWEEN (number) O'CLOCK AND (number) O'CLOCK (number) MILES,

or

number) MILE BAND OF WEATHER/CHAFF FROM (fix or number of miles and direction from ix) TO (fix or number of miles and direction from ix),

or

level number and intensity adjective) WEATHER ECHO BETWEEN (number) O'CLOCK AND (number) O'CLOCK, (number) MILES. MOVING (direction) AT (number) KNOTS, TOPS (altitude).

2-103c Example. — "Level five intense weather echo between eleven o'clock and one o'clock, one zero miles. Moving east at two zero knots, tops flight level three niner zero."

2-103c Note. — The third phraseology is only applicable when the radar weather echo intensity information is determined by NWS radar equipment.

2-103c Reference. — Glossary (Radar Weather Echo Intensity Levels).

2-104 CALM WIND CONDITIONS

TERMINAL

Describe the wind as calm when the wind velocity is less than three knots.

2-105 REPORTING WEATHER CONDITIONS

a. *USA/USAF NOT APPLICABLE.* When the prevailing visibility at the usual point of observation, or at the tower level, is less than 4 miles, tower personnel shall take prevailing visibility observations and apply the observations as follows:

(1) Use the lower of the two observations (tower or surface) for aircraft operations.

(2) Forward tower visibility observations to the weather observer.

(3) Notify the weather observer when the tower observes the prevailing visibility to decrease to less than 4 miles or increase to 4 miles or more.

b. Forward current weather changes to the appropriate control facility as follows:

(1) When the official weather changes to a condition which is below 1,000-foot ceiling or below the highest circling minimum, whichever is greater, or less than 3 miles visibility, and when it improves to a condition which is better than those above. *USAF:* Use 1,500 foot ceiling.

(2) Changes which are classified as special weather observations during the time that weather conditions are below 1,000-foot ceiling or the highest circling minimum, whichever is greater, or less than 3 miles visibility. *USAF:* Use 1,500 foot ceiling.

c. Towers at airports where military turbo-jet en route descents are routinely conducted shall also report the conditions to the ARTCC even if it is not the controlling facility.

d. If the receiving facility informs you that weather reports are not required, discontinue the reports. The time period specified should not exceed the duration of your tour of duty.

e. *EN ROUTE:* When you determine that weather reports for an airport will not be required for a specific time period, inform the FSS or tower of this determination. The time period specified should not exceed the duration of your tour of duty.

2-106 DISSEMINATING WEATHER INFORMATION

TERMINAL

Observed elements of weather information shall be disseminated as follows:

a. General weather information, such as "large breaks in the overcast," "visibility lowering to the south," or similar statements which do not include specific values, and any elements derived directly from instruments, pilots, or radar may be transmitted to pilots or other ATC facilities without consulting the weather reporting station.

b. Specific values, such as ceiling and visibility, may be transmitted if obtained by one of the following means:

(1) You are properly certificated and acting as official weather observer for the elements being reported.

2-106b(1) Note. — USAF controllers do not serve as official weather observers.

(2) You have obtained the information from the official observer for the elements being reported.

(3) The weather report was composed or verified by the weather station.

c. Differences between weather elements observed from the tower and those reported by the weather station shall be reported to the official observer for the element concerned.

2-107 thru 2-109 RESERVED

Section 7. ALTIMETER SETTINGS

2-110 CURRENT SETTINGS

a. Current altimeter settings shall be obtained from direct-reading instruments or directly from weather reporting stations.

2-110a Note. — The term 'current' does not apply to altimeter settings reported or received as estimated.

2-110a Reference. — Order 7210.3, Chapter 2, Section 8.

b. If a pilot requests the altimeter setting in millibars, ask the nearest weather reporting station for the equivalent millibar setting.

2-111 ALTIMETER SETTING ISSUANCE BELOW LOWEST USABLE FL

a. *TERMINAL:* Identify the source of an altimeter setting when issued for a location other than the aircraft's departure or destination airport.

b. *EN ROUTE:* Identify the source of all altimeter settings when issued.

Phraseology:

THE (facility name) (time of report if more than one hour old) ALTIMETER (setting).

c. Issue the altimeter setting:

(1) To en route aircraft at least one time while operating in your area of jurisdiction. Issue the setting for the nearest reporting station along the aircraft's route of flight:

2-111c(1) Note. — FAR 91.81(1) requires that the pilot set his altimeter to the setting of a station along his route of flight within 100 miles of the aircraft if one is available. However, issuance of the setting of an adjacent station during periods that a steep gradient exists will serve to inform the pilot of the difference between the setting he is using and the pressure in the local area and better enable him to choose a more advantageous setting within the limitations of FAR 91.81.

(2) *TERMINAL:* To all departures. Unless specifically requested by the pilot, the altimeter setting need not be issued to local aircraft operators who have requested this omission in writing or to scheduled air carriers.

2-111c(2) Reference. — Departure Information, 3-100.

(3) *TERMINAL:* To arriving aircraft on initial contact or as soon as possible thereafter. The tower may omit the altimeter if the aircraft is sequenced or vectored to the airport by the approach control having jurisdiction at that facility.

2-111c(3) Reference. — Approach Information by Approach Control Facilities, 4-72a; Approach Information, 5-131a.

(4) *EN ROUTE:* For the destination airport to arriving aircraft approximately 50 miles from the destination if an approach control facility does not serve the airport.

d. If the altimeter setting must be obtained by the pilot of an arriving aircraft from another source, instruct the pilot to obtain the altimeter setting from that source.

2-111d Note 1. — The destination altimeter setting, whether from a local or remote source, is the setting upon which the instrument approach is predicated.

2-111d Note 2. — Approach charts for many locations specify the source of altimeter settings as non-FAA facilities, such as UNICOM's.

e. When issuing clearance to descend below the lowest usable flight level, advise the pilot of the altimeter setting of the weather reporting station nearest the point the aircraft will descend below that flight level.

f. Department of Defense (DOD) aircraft which will operate on "single altimeter settings" (FAR Exemption 2861A) shall be issued altimeter settings in accord with standard procedures while the aircraft are en route to and from their restricted areas, MOA's, and ATC Assigned Airspace areas.

2-111f Reference. — Order 7210.3 — 661.

2-112 thru 2-119 RESERVED

Section 8. RUNWAY VISIBILITY REPORTING — TERMINAL

2-120 FURNISH RVR/RVV VALUES

Where RVR or RVV equipment is operational, irrespective of subsequent operation or non-operation of navigational or visual aids for the application of RVR/RVV as a takeoff or landing minima, furnish the values for the runway in use in accordance with 2-122.

2-120 Note. — Readout capability of different type/model RVR equipment varies. For example, older equipment minimum readout value is 600 feet. Newer equipment may have minimum readout capability as low as 100 feet. Readout value increments also may differ. Older equipment have minimum readout increments of 200 feet. New equipment increments below 800 feet are 100 feet.

2-120 Reference. — Order 6560.10, Runway Visual Range (RVR). Order 6750.24, ILS Electronic Requirements.

2-121 ARRIVAL/DEPARTURE RUNWAY VISIBILITY

a. Issue current touchdown RVR/RVV for the runway/s in use:

(1) When prevailing visibility is 1 mile or less regardless of the value indicated.

(2) When RVR/RVV indicates a reportable value regardless of the prevailing visibility.

2-121a(2) Note. — Reportable values are: RVR 6,000 feet or less; RVV 1 ½ miles or less.

b. Issue mid/rollout RVR when the value of either is less than 2,000 feet and less than the touchdown value.

2-122 TERMINOLOGY

a. Provide RVR/RVV information by stating the runway, the abbreviation RVR/RVV, and the indicated value. When issued along with other weather elements, transmit these values in the normal sequence used for weather reporting.

2-122a Examples. —

"Runway One Four R-V-R two thousand four hundred."

"Runway Three Two R-V-V three quarters."

b. When two or more RVR systems serve the runway in use, report the indicated values for the different systems in terms of touchdown, mid, and rollout as appropriate.

2-122b Examples. —

"Runway Two Two Left R-V-R two thousand, rollout one thousand eight hundred."

"Runway Two Seven Right R-V-R one thousand, mid eight hundred, rollout six hundred."

c. When there is a requirement to issue an RVR or RVV value and a visibility condition greater or less than the reportable values of the equipment is indicated, state the condition as "MORE THAN" or "LESS THAN" the appropriate minimum or maximum readable value.

2-122c Examples. —

"Runway Three Six R-V-R more than six thousand."

"Runway Niner R-V-R one thousand, rollout less than six hundred."

d. When a readout indicates a rapidly varying visibility condition (1,000 feet or more for RVR; one or more reportable values for RVV), report the current value followed by the range of visibility variance.

2-122d Examples. —

"Runway Two Four R-V-R two thousand, variable one thousand six hundred to three thousand."

"Runway Three One R-V-V three-quarters, variable one-quarter to one."

TABLE OF CONTENTS

Page

Chapter 3. AIRPORT TRAFFIC CONTROL — TERMINAL

Section 1. GENERAL

3-1 Provide Service 3-1
3-2 Preventive Control 3-1
3-3 Use of Active Runways 3-1
3-4 Coordination Between Local and Ground Controllers 3-1
3-5 Vehicles/Equipment/Personnel on Runways 3-1
3-6 Traffic Information 3-2
3-7 Position Determination 3-2
3-8 Low Level Wind Shear Advisories 3-2
3-9 Use of Tower Radar Displays 3-2
3-10 Observed Abnormalities 3-3
3-11 Airport Traffic Area Restrictions 3-3
3-12—3-19 Reserved 3-3

Section 2. VISUAL SIGNALS

3-20 Light Signals 3-4
3-21 Warning Signal 3-4
3-22 Receiver-Only Acknowledgment 3-4
3-23—3-29 Reserved 3-4

Section 3. AIRPORT CONDITIONS

3-30 Landing Area Condition 3-5
3-31 Closed/Unsafe Runway Information 3-5
3-32 Timely Information 3-5
3-33 Braking Action 3-5
3-34 Braking Action Advisories 3-6
3-35 Arresting System Operation 3-6
3-36—3-39 Reserved 3-7

Section 4. AIRPORT LIGHTING

3-40 Emergency Lighting 3-8
3-41 Runway End Identifer Lights 3-8
3-42 Visual Approach Slope Indicators (VASI) 3-8
3-43 Approach Lights 3-8
3-44 ALS Intensity Settings 3-8
3-45 Sequenced Flashing Lights 3-9
3-46 MALSR/ODALS 3-9
3-47 Runway Edge Lights 3-9
3-48 High Intensity Runway, Runway Centerline, and Touchdown Zone Lights 3-10
3-49 HIRL Associated with MALSR 3-10
3-50 HIRL Changes Affecting RVR 3-10
3-51 Medium Intensity Runway Lights 3-10
3-52 Simultaneous Approach and Runway Edge Light Operation 3-10
3-53 High Speed Turnoff Lights 3-10
3-54 Taxiway Lights 3-10
3-55 Obstruction Lights 3-10
3-56 Rotating Beacon 3-11
3-57—3-59 Reserved 3-11

TABLE OF CONTENTS—*Continued*

Page

Chapter 3. AIRPORT TRAFFIC CONTROL — TERMINAL

Section 5. RUNWAY SELECTION

3-60 Selection 3-12
3-61 STOL Runways 3-12
3-62 Tailwind Components 3-12
3-63—3-69 Reserved 3-12

Section 6. AIRPORT SURFACE DETECTION PROCEDURES

3-70 Equipment Usage 3-13
3-71 Information Usage 3-13
3-72 Identification 3-13
3-73—3-79 Reserved 3-13

Section 7. TAXI AND GROUND MOVEMENT PROCEDURES

3-80 Ground Traffic Movement 3-14
3-81 Taxi and Ground Movement Operation 3-14
3-82 Ground Operations 3-14
3-83 Runway Proximity 3-15
3-84 ILS Critical Areas 3-15
3-85—3-89 Reserved 3-16

Section 8. SPACING AND SEQUENCING

3-90 Sequence/Spacing Application 3-17
3-91 Touch-and-Go or Stop-and-Go or Low Approach 3-17
3-92 Simultaneous Same Direction Operation 3-17
3-93 Simultaneous Opposite Direction Operation 3-17
3-94—3-99 Reserved 3-18

Section 9. DEPARTURE PROCEDURES AND SEPARATION

3-100 Departure Information 3-19
3-101 Departure Delay Information 3-19
3-102 Departure Control Instructions 3-19
3-103 Takeoff Position Hold 3-19
3-104 Anticipating Separation 3-20
3-105 Traffic Information — Departing Aircraft 3-20
3-106 Same Runway Separation 3-20
3-107 Intersection Takeoff 3-21
3-108 Intersecting Runway Separation 3-22
3-109 Takeoff Clearance 3-23
3-110 Cancellation of Takeoff Clearance 3-23
3-111—3-119 Reserved 3-23

Section 10. ARRIVAL PROCEDURES AND SEPARATION

3-120 Landing Information 3-24
3-121 Forwarding Approach Information by Nonapproach Control Facilities 3-24
3-122 Same Runway Separation 3-24
3-123 Intersecting Runway Separation 3-25
3-124 Wheels Down Check 3-27
3-125 Wind Information 3-27
3-126 Landing Clearance 3-27
3-127 Anticipating Separation 3-28
3-128 Landing Clearance Without Visual Observation 3-28
3-129 Withholding Landing Clearance 3-28
3-130 Runway Exiting 3-28

TABLE OF CONTENTS—Continued

Page

Chapter 3. AIRPORT TRAFFIC CONTROL — TERMINAL

3-131 Altitude Restricted Low Approach 3-28
3-132 Closed Traffic 3-28
3-133 Overhead Approach 3-28
3-134 Simulated Flameout Operations/Practice Precautionary Approaches 3-29
3-135—3-139 Reserved 3-30

Section 11. HELICOPTER OPERATIONS

3-140 Taxi and Ground Movement Operation 3-31
3-141 Helicopter Takeoff Clearance 3-30
3-142 Helicopter Departure Separation 3-32
3-143 Helicopter Arrival Separation 3-32
3-144 Simultaneous Landings or Takeoffs 3-32
3-145 Helicopter Landing Clearance 3-3
3-146—3-149 Reserved 3-33

Section 12. SEA LANE OPERATIONS

3-150 Application 3-34
3-151 Departure Separation 3-34
3-152 Arrival Separation 3-34

Chapter 3. AIRPORT TRAFFIC CONTROL — TERMINAL

Section 1. GENERAL

3-1 PROVIDE SERVICE

Provide airport traffic control service based only upon observed or known traffic and airport conditions.

3-1 Note. — When operating in accordance with the FAR's, it is the responsibility of the pilot to avoid collision with other aircraft. However, due to the limited space around terminal locations, traffic information can aid pilots in avoiding collision between aircraft operating within control zones, airport traffic areas, terminal radar service areas, terminal control areas, and transiting aircraft operating in proximity to terminal locations.

3-2 PREVENTIVE CONTROL

Provide preventive control service only to aircraft operating in accordance with a letter of agreement. When providing this service, issue advice or instructions only if a situation develops which requires corrective action.

3-2 Note. — Preventive control differs from other airport traffic control in that repetitious, routine approval of pilot action is eliminated. Controllers intervene only when they observe a traffic conflict developing.

3-3 USE OF ACTIVE RUNWAYS

For ATC purposes, the local controller has primary responsibility for operations on the active runway and must control the use of those runways. Positive coordination and control are required as follows:

3-3 Note. — Exceptions may be authorized only as provided in paragraph 1-9 and Order 7210.3 — 1205 where justified by extraordinary circumstances at specific locations.

3-3 Reference. — Order 72103 — 1205.b., Use of Active Runways.

a. Ground control must obtain approval from local control before authorizing an aircraft or vehicle to cross or use any portion of an active runway.

b. Aircraft may be authorized to taxi along an active runway by local control, via direct communications on the control frequency, or by ground control after coordination with local control is completed.

c. The local controller shall coordinate with the ground controller before using a runway not previously designated as active.

3-3c Reference. — Order 7210.3 — 1204, Selecting Active Runways.

3-4 COORDINATION BETWEEN LOCAL AND GROUND CONTROLLERS

Local and ground controllers shall exchange information as necessary for the safe and efficient use of airport runways and movement areas. This may be accomplished via verbal means, flight progress strips, other written information, or automation displays. As a minimum, provide aircraft identification and applicable runway/intersection/taxiway information as follows:

a. Ground control shall notify local control when a departing aircraft has been taxied to a runway other than one previously designated as active.

3-4a Reference. — Use of Active Runways, 3-3. Order 7210.3 — 1204, Selecting Active Runways.

b. Ground control shall notify local control of any aircraft taxied to an intersection for takeoff, unless departure from that intersection is specifically designated via prior coordination or facility directive as the standard operating procedure for the runway to be used. When standard procedures require departures to use a specific intersection, ground control shall notify local control when aircraft are taxied to other portions of the runway for departure.

3-4b Reference. — Intersection Takeoff, 3-107.

c. When the runways in use for landing/departing aircraft are not visible from the tower or the aircraft using them are not visible on radar, advise the local/ground controller of the aircraft's location before releasing the aircraft to the other controller.

3-5 VEHICLES/EQUIPMENT/PERSONNEL ON RUNWAYS

Ensure that the runway to be used is clear of all known ground vehicles, equipment, and personnel before a departing aircraft starts takeoff or a landing aircraft crosses the runway threshold.

3-5 Reference. — Touch-and-Go or Stop-and-Go or Low Approach, 3-91.

3-6 TRAFFIC INFORMATION

a. Describe vehicles, equipment, or personnel on or near the movement area in a manner which will assist pilots in recognizing them.

3-6a Examples. —

"Mower to left of Runway Two Seven."

"Trucks crossing approach end of Runway Two Five."

"Workman on Taxiway Bravo."

"Aircraft to left of Runway One Eight."

b. Describe the relative position of traffic in an easy to understand manner, such as "to your right," or "ahead of you."

3-6b Examples. —

"Traffic, Eastern DC-9 on downwind leg to your left."

"Twin Bonanza inbound from outer marker on straight-in approach to Runway One Seven."

c. When using a certified tower radar display, you may issue traffic advisories using the standard radar phraseology prescribed in paragraph 2-21.

3-7 POSITION DETERMINATION

a. Determine the position of an aircraft before issuing taxi instructions or takeoff clearance.

3-7 Note. — The aircraft's position may be determined visually by the controller, by pilots, or through use of ASDE.

b. When a local controller delivers or amends an ATC clearance to an aircraft awaiting departure and that aircraft is holding short of a runway or is holding in position on a runway, an additional clearance shall be issued to prevent the possibility of the aircraft inadvertently taxiing onto the runway and/or beginning takeoff roll. In such cases, append one of the following ATC instructions as appropriate:

(1) HOLD SHORT OF RUNWAY, *or*

(2) HOLD IN POSITION.

3-8 LOW LEVEL WIND SHEAR ADVISORIES

At those locations equipped with a Low Level Wind Shear Alert System, the local controller shall provide wind information as follows:

3-8 Note. — The LLWAS is designed to detect possible low level wind shear conditions around the periphery of an airport. It does not detect wind shear beyond that limitation.

3-8 Reference. — Order 7210.3 — 1222, Low Level Wind Shear Alert System (LLWAS).

a. If an alert is received, issue the centerfield wind and the displayed field boundary wind.

3-8a Example. —

"Centerfield wind, two seven zero at one zero. East boundary wind, one eight zero at two five."

b. If unstable conditions produce multiple alerts, issue an advisory that there are wind shear alerts in several/all quadrants. Then, issue the centerfield wind in accordance with 3-100b. followed by the field boundary wind most appropriate to the aircraft operation.

3-8b Example. —

"Wind shear alerts all quadrants. Centerfield wind, two one zero at one four. West boundary wind, one four zero at two two."

c. If requested by the pilot, issue specific field boundary wind information even though the LLWAS may not be in an alert status.

3-8c Example. —

"Northeast boundary wind, two three zero at two zero."

3-8c Note. — The requirements of 3-100, 3-8a. and b., and 3-120. (reference issuance of wind information) remain valid, as appropriate.

3-9 USE OF TOWER RADAR DISPLAYS

a. Local controllers may use certified tower radar displays for the following purposes:

(1) To determine an aircraft's identification, exact location, or spatial relationship to other aircraft.

3-9a(1) Note. — This authorization does not alter visual separation procedures. When employing visual separation, the provisions of paragraph 7-10 apply unless otherwise authorized by AAT-1.

3-9a(1) Reference. — Primary Radar Identification Methods, 5-51; Beacon Identification Methods, 5-52; ARTS/PIDP Identification Methods, 5-53.

(2) To provide aircraft with radar traffic advisories.

(3) To provide a direction or suggested headings to VFR aircraft as a method for radar identification or as an advisory aid to navigation.

Phraseology:

(Identification), PROCEED (direction)-BOUND, (other instructions or information as necessary),

or

(Identification), SUGGESTED HEADING (degrees), (other instructions as necessary).

3-9a(3) Note. — It is important that the pilot be aware of the fact that the directions or headings being provided are suggestions or are advisory in nature. This is to keep the pilot from being inadvertently mislead into assuming that radar vectors (and other associated radar services) are being provided when, in fact, they are not.

(4) To provide information and instructions to aircraft operating within the airport traffic area.

3-9a(4) Example. —

"Turn base leg now."

3-9a Note. — Unless otherwise authorized, tower radar displays are intended to be an aid to local controllers in meeting their responsibilities to the aircraft operating on the runways or within the airport traffic area. They are not intended to provide radar benefits to pilots except for those accrued through a more efficient and effective local control position. In addition, local controllers at nonapproach control towers must devote the majority of their time to visually scanning the runways and local area; an assurance of continued positive radar identification could place distracting and operationally inefficient requirements upon the local controller. Therefore, since the requirements of paragraph 5-50 cannot be assured, the radar functions prescribed above are not considered to be radar services and pilots should not be advised of being in "radar contact."

b. Additional functions may be performed provided the procedures have been reviewed and authorized by appropriate management levels.

3-10 OBSERVED ABNORMALITIES

When requested by a pilot or when you deem it necessary, inform an aircraft of any observed abnormal aircraft condition.

Phraseology:

(Item) APPEAR/S (observed condition).

3-10 Examples. —

"Landing gear appears down and in place."

"Rear baggage door appears open."

3-11 AIRPORT TRAFFIC AREA RESTRICTIONS

a. If traffic conditions permit, approve a pilot's request to cross an airport traffic area or exceed the airport traffic area speed limit. Do not, however, approve a speed in excess of 250 knots (288 mph) unless the pilot informs you a higher minimum speed is required.

3-11a Note. — FAR 91.70 permits speeds in excess of 250 knots (288 mph) when so required or recommended in the airplane flight manual or required by normal military operating procedures.

3-11a Reference. — Airport Traffic Areas, 2-16.

b. Do not approve a pilot's request or ask a pilot to conduct unusual maneuvers within an airport traffic area if they are not essential to the performance of the flight.

3-11b Note. — These unusual maneuvers include unnecessary low passes, unscheduled flybys, practice instrument approaches to altitudes below specified minima (unless a landing or touch-and-go is to be made), or any so-called "buzz jobs" wherein a flight is conducted at a low altitude and/or a high rate of speed for thrill purposes. Such maneuvers increase hazards to persons and property and contribute to noise complaints.

3-12 thru 3-19 RESERVED

Section 2. VISUAL SIGNALS

3-20 LIGHT SIGNALS

Use air traffic control light signals from the Table to control aircraft and the movement of vehicles, equipment, and personnel on the movement area when radio communications cannot be employed.

3-20 Reference. — Order 7210.3 — 430, Letters of Agreement.

3-20 Table. — ATC Light Signals.

	Meaning		
Color and type of signal	*Aircraft on the ground*	*Aircraft in flight*	*Movement of vehicles, equipment, and personnel*
Steady green	Cleared for takeoff	Cleared to land	Cleared to cross; proceed; go
Flashing green	Cleared to taxi	Return for landing (to be followed by steady green at the proper time)	Not applicable
Steady red	Stop	Give way to other aircraft and continue circling	Stop
Flashing red	Taxi clear of landing area/ runway in use	Airport unsafe — do not land	Clear the taxiway/ runway
Flashing white	Return to starting point on airport	Not applicable	Return to starting point on airport
Alternating red and green	General Warning Signal — Exercise Extreme Caution		

3-21 WARNING SIGNAL

Direct a general warning signal to aircraft or vehicle operators, as appropriate, when:

3-21 Note. — The warning signal is not a prohibitive signal and can be followed by any other light signal, as circumstances permit.

a. Aircraft are converging and a collision hazard exists.

b. Mechanical trouble exists of which the pilot might not be aware.

c. Other hazardous conditions are present which call for intensified pilot or operator alertness. These conditions may include obstructions, soft field, ice on the runway, etc.

3-22 RECEIVER-ONLY ACKNOWLEDGMENT

To obtain acknowledgment from an aircraft equipped with receiver only, request the aircraft to do the following:

a. Between sunrise and sunset:

(1) Move ailerons or rudders while on the ground.

(2) "Rock" wings while in flight.

b. Between sunset and sunrise — "Blink" navigation or landing lights.

3-23 thru 3-29 RESERVED

Section 3. AIRPORT CONDITIONS

3-30 LANDING AREA CONDITION

If you observe or are informed of any condition which affects the safe use of a landing area:

3-30 Note 1. — The airport management/military operations office is responsible for observing and reporting the condition of the landing area.

3-30 Note 2. — It is the responsibility of the agency operating the airport to provide the tower with current information regarding airport conditions.

3-30 Note 3. — A disabled aircraft on a runway, after occupants are clear, is normally handled by Flight Standards and airport management/military operations office personnel in the same manner as any obstruction; e.g., construction equipment.

a. Relay the information to the aircraft manager/military operations office concerned.

b. Copy verbatim any information received and record the name of the person submitting it.

c. Confirm information obtained from other than authorized airport or FAA personnel unless this function is the responsibility of the military operations office.

3-30c Note. — Civil airport managers are required to provide a list of airport employees who are authorized to issue information concerning conditions affecting the safe use of the airport.

d. If you are unable to contact the airport management or operator, issue a Notice to Airmen publicizing an unsafe condition and inform the management or operator as soon as practicable.

3-30d Example. —

"Disabled aircraft on runway."

3-30d Note 1. — Legally, only the airport management/military operations office can close a runway.

3-30d Note 2. — Military controllers are not authorized to issue Notices to Airmen. It is the responsibility of the military operations office.

e. Issue to aircraft only factual information, as reported by the airport management concerning the condition of the runway surface, describing the accumulation of precipitation.

3-30e Example. —

"All runways covered by compacted snow six inches deep."

3-31 CLOSED/UNSAFE RUNWAY INFORMATION

If an aircraft requests to takeoff, land, or touch-and-go on a closed or unsafe runway, inform the pilot the runway is closed or unsafe, and

a. If the pilot persists in his request, quote him the appropriate parts of the Notice to Airmen applying to the runway and inform him that a clearance cannot be issued.

b. Then, if the pilot insists and in your opinion the intended operation would not adversely affect other traffic, inform him that the operation will be at his own risk.

Phraseology:

RUNWAY (runway number) CLOSED/UNSAFE.

If appropriate,

(quote Notice to Airmen information), UNABLE TO

ISSUE DEPARTURE/LANDING/TOUCH-AND-GO CLEARANCE.

DEPARTURE/LANDING/TOUCH-AND-GO WILL BE AT YOUR OWN RISK.

c. Except as permitted by 4-86, where parallel runways are served by separate ILS systems and one of the runways is closed, the ILS associated with the closed runway should not be used for approaches unless not using the ILS would have an adverse impact on the operational efficiency of the airport.

3-31 Reference. — Landing Clearance, 3-127.

3-32 TIMELY INFORMATION

Issue airport condition information necessary for an aircraft's safe operation in time for it to be useful to the pilot. Include the following, as appropriate:

a. Construction work on or immediately adjacent to the movement area.

b. Rough portions of the movement area.

c. Braking conditions caused by ice, snow, slush, or water.

d. Snowdrifts or piles of snow on or along the edges of the area and the extent of any plowed area.

e. Parked aircraft on the movement area.

f. Irregular operation of part or all of the airport lighting system.

g. Other pertinent airport conditions.

3-32 Reference. — Airport Conditions, 4-70.

3-33 BRAKING ACTION

Furnish quality of braking action, as received from pilots or the airport management, to all aircraft as follows:

a. Describe the quality of braking action using the terms "good," "fair," "poor," "nil," or a combination of these terms. If the pilot or airport management reports braking action in other than the foregoing terms, ask him to categorize braking action in these terms.

3-33a Note. — The term "nil" is used to indicate bad or no braking action.

b. Include type of aircraft or vehicle from which the report is received.

3-33a and b Examples. —

"Braking action fair to poor, reported by a D-C Ten."

"Braking action poor, reported by a Boeing Seven Twenty-seven."

c. If the braking action report affects only a portion of a runway, obtain enough information from the pilot or airport management to describe the braking action in terms easily understood by the pilot.

3-33c Examples. —

"Braking action poor first half of runway, reported by a Lockheed Ten Eleven."

"Braking action poor beyond the intersection of Runway Two Seven, reported by a Boeing Seven Twenty-seven."

3-33c Note. — Descriptive terms, such as the first or the last half of the runway, should normally be used rather than landmark descriptions, such as opposite the fire station, south of a taxiway, etc. Landmarks extraneous to the landing runway are difficult to distinguish during low visibility, at night, or anytime a pilot is busy landing an aircraft.

d. Furnish runway friction measurement readings/values as received from airport management to aircraft as follows:

(1) At locations where friction measuring devices, such as Mu-Meter, Saab Friction Tester (SFT), and Skiddometer are in use, furnish information as received from the airport management to pilots on request. Use the name of the device followed by the number for each of three runway segments, a word describing the cause of the runway friction problem, and the time of the report.

3-33d(1) Examples. —

"(Name of device), eight, six, seven, snow at zero niner three zero."

"(Name of device), thirty-five, twenty-six, thirty, sleet at one zero one five."

(2) Issue the RUNWAY SURFACE CONDITION and/or the RUNWAY CONDITION READING (RCR), if provided, to all USAF and ANG aircraft. Issue the RCR to other aircraft upon pilot request.

3-33d(2) Example. —

"Ice on runway, RCR zero five, patchy."

3-33d(2) Note 1. — USAF has established RCR procedures for determining the average deceleration readings of runways under conditions of water, slush, ice, or snow. The use of the RCR code is dependent upon the pilot's having a "stopping capability chart" specifically applicable to his aircraft.

3-33d(2) Note 2. — USAF offices furnish RCR information at airports serving USAF and ANG aircraft.

3-33d(2) Reference. — Airport Conditions, 4-70.

3-34 BRAKING ACTION ADVISORIES

a. When runway braking action reports are received from pilots or the airport management which include the terms "poor" or "nil." or whenever weather conditions are conducive to deteriorating or rapidly changing runway conditions, include on the ATIS broadcast the statement "BRAKING ACTION ADVISORIES ARE IN EFFECT."

3-34a Reference. — Order 7210.3 — 1230, Automatic Terminal Information Service.

b. During the time Braking Action Advisories are in effect, take the following action:

(1) Issue the latest braking action report for the runway in use to each arriving and departing aircraft. When possible, include reports from heavy jet aircraft when the arriving or departing aircraft is a heavy jet.

(2) Advise the airport management that runway braking action reports of "poor" or "nil" have been received.

3-34b(2) Reference. — Order 7210.3 — 430, Letters of Agreement.

(3) Solicit PIREP's of runway braking action.

3-34b(3) Reference. — PIREP Information, 2-102.

3-35 ARRESTING SYSTEM OPERATION

a. For normal operations, arresting systems remotely controlled by air traffic control shall remain in the retracted or down position.

3-35a Note 1. — USN Runway Arresting Gear-Barriers are not operated by air traffic control personnel. Readiness/rigging of the equipment is the responsibility of the operations department.

3-35a Note 2. — A request to raise a barrier or hook cable means the barrier or cable on the departure end of the the runway. If an approach end engagement is required, the pilot or military authority will specifically request that the approach end cable be raised.

Reference. — Order 7610.4, 1561-1565.

b. Raise aircraft arresting systems whenever:

(1) Requested by a pilot.

3-35b(1) Note. — The standard emergency phraseology for a pilot requesting an arresting system to be raised for immediate engagement is "Barrier-Barrier-Barrier" or "Cable-Cable-Cable."

(2) Requested by military authority; e.g., airfield manager, supervisor of flying, mobile control officer, etc.

(3) A military jet aircraft is landing with known or suspected radio failure or conditions

(drag chute/hydraulic/electrical failure, etc.) that indicate an arresting system may be needed. Exceptions are authorized for military aircraft which cannot engage an arresting system (C-9, C-141, C-5, T-39, etc.) and should be identified in a letter of agreement and/or appropriate military directive.

c. When requested by military authority due to freezing weather conditions or malfunction of the activating mechanism, the barrier/cable may remain in a raised position provided aircraft are advised.

Phraseology:

YOUR DEPARTURE/LANDING WILL BE TOWARD/OVER A RAISED BARRIER/CABLE ON RUNWAY (number), (location, distance, as appropriate).

d. Inform civil and U.S. Army aircraft whenever rubber supported cables are in place at the approach end of the landing runway, and include the distance of the cables from the threshold. This information may be omitted if it is published in the "Notices to Airmen" publication/DOD FLIP.

3-35d Example. —

"Runway One Four arresting cable one thousand feet from threshold."

e. When arresting system operation has been requested, inform the pilot of the indicated barrier/cable position.

Phraseology:

(Identification), BARRIER/CABLE INDICATES UP/DOWN. CLEARED FOR TAKEOFF/TO LAND.

f. Time permitting, advise pilots of the availability of all arresting systems on the runway in question when a pilot requests barrier information.

g. If an aircraft engages a raised barrier/cable, initiate crash alarm procedures immediately.

3-35g. Note. — *USAF/USN:* For preplanned practice engagements not associated with emergencies, crash alarm systems need not be activated if — in accordance with local military operating procedures — all required notifications are made before the practice engagement.

3-36 thru 3-39 RESERVED

Section 4. AIRPORT LIGHTING

3-40 EMERGENCY LIGHTING

Whenever you become aware that an emergency has or will occur, take action to provide for the operation of all appropriate airport lighting aids as required.

3-40 Reference. — Lighting Requirements, 9-41.

3-41 RUNWAY END IDENTIFIER LIGHTS

When separate on-off controls are provided, operate runway end identifier lights:

a. When the associated runway lights are lighted. Turn the REIL off after:

(1) An arriving aircraft has landed.

(2) A departing aircraft has left the traffic pattern area.

(3) It is determined that the lights are of no further use to the pilot.

b. As required by facility directives to meet local conditions.

c. As requested by the pilot.

3-42 VISUAL APPROACH SLOPE INDICATORS (VASI)

VASI systems with remote on-off switching shall be operated when they serve the runway in use and where intensities are controlled in accordance with the Tables, except:

a. As required by facility directives to meet local conditions.

b. As required by the pilot.

3-42 Table 1. — VASI Intensity Setting — Two Step System.

Step	*Period/Condition*
High	Day — Sunrise to sunset.
Low	Night — Sunset to sunrise.

3-42 Table 2. — VASI Intensity Setting — Three Step System.

Step	*Period/Condition*
High	Day — Sunrise to sunset.
Medium	Twilight — From sunset to 30 minutes after sunset and from 30 minutes before sunrise to sunrise, and during twilight in Alaska. Note — During a 1 year period, twilight may vary 26 to 43 minutes between 25 and 49N latitude.
Low	Night — From 30 minutes after sunset to 30 minutes before sunrise.

3-42 Note. — The basic FAA standard for VASI systems permits independent operation by means of photoelectric device. This system has no on-off control feature and is intended for continuous operation. Other VASI systems in use include those that are operated remotely from the control tower. These systems may consist of either a photoelectric intensity control with only an on-off switch, a two step intensity system, or a three step intensity system.

3-42 Reference. — Order 7210.3 — 1254, VASI Systems. Order 6850.2, Visual Guidance Lighting Systems.

3-43 APPROACH LIGHTS

Operate approach lights:

a. Between sunset and sunrise when one of the following conditions exists:

(1) They serve the landing runway.

(2) They serve a runway to which an approach is being made but aircraft will land on another runway.

b. Between sunrise and sunset when the ceiling is less than 1,000 feet or the prevailing visibility is 5 miles or less and approaches are being made to:

(1) A landing runway served by the lights.

(2) A runway served by the lights but aircraft are landing on another runway.

(3) The airport, but landing will be made on a runway served by the lights.

c. As requested by the pilot.

d. As you deem necessary, if not contrary to pilot's request.

3-43 Note. — In the interest of energy conservation, the ALS should be turned off when not needed for aircraft operations.

3-44 ALS INTENSITY SETTINGS

When operating ALS as prescribed in 3-43, operate intensity controls in accordance with the values in the Table except:

a. When facility directives specify other settings to meet local atmospheric, topographic, and twilight conditions.

b. As requested by the pilot.

c. As you deem necessary, if not contrary to pilot's request.

3-44 Table. — ALS Intensity Setting

Step	*Visibility — (Applicable to runway served by lights)*	
	Day	*Night*
5	Less than 1 mile*	When requested
4	1 to but not including 3 miles	When requested
3	3 to but not including 5 miles	Less than 1 mile*
2	5 to but not including 7 miles	1 to 3 miles inclusive
1	When requested	Greater than 3 miles

*and/or 6,000 feet or less of the RVR on the runway served by the ALS and RVR.

3-44 Note. — Daylight Steps 2 and 3 provide recommended settings applicable to conditions in subparagraphs b. and c.

3-45 SEQUENCED FLASHING LIGHTS

Operate Sequenced Flashing Lights:

3-45 Note. — SFL are a component of the ALS and cannot be operated when the ALS is off.

a. When the visibility is less than 3 miles and instrument approaches are being made to the runway served by the associated ALS.

b. *USAF:* When the ceiling is below 1,000 feet or the visibility is less than 3 miles and approaches are being made to the runway served by the associated ALS.

c. As requested by the pilot.

d. As you deem necessary, if not contrary to pilot's request.

3-46 MALSR/ODALS

Operate MALSR/ODALS that have separate on-off and intensity setting controls in accordance with the following Tables except:

a. When facility directives specify other settings to meet local atmospheric, topographic, and twilight conditions.

b. As requested by the pilot.

c. As you deem necessary, if not contrary to pilot's request.

3-46 Table 1. — Two Step MALS/One Step RAIL/Two Step ODALS

Settings		*Visibility*	
		Day	*Night*
MALS/ODALS............ RAIL..............................	Hi On	Less than 3 miles	Less than 3 miles*
MALS/ODALS............ RAIL..............................	Low Off	When requested	3 miles or more

* At locations providing part-time control tower service, if duplicate controls are not provided in the associated FSS, the MALSR/ODALS shall be set to low intensity during the hours of darkness when the tower is unmanned.

3-46 Table 2. — Three Step MALS/Three Step RAIL

Settings	*Visibility*	
	Day	*Night*
3	Less than 2 miles	Less than 1 mile
2	2 to 5 miles inclusive	1 to but not including 3 miles*
1	When requested	3 miles or more

*At locations providing part-time control tower service, if duplicate controls are not provided in the FSS on the airport, the air-to-ground radio link shall be activated during the hours of darkness when the tower is unmanned. If there is no radio air-to-ground control, the MALSR/ODALS shall be set on intensity setting 2 during the hours of darkness when the tower is unmanned. (See Order 7210.3 — 1253.)

3-47 RUNWAY EDGE LIGHTS

Operate the runway edge light system/s serving the runway/s in use as follows:

a. Between sunset and sunrise, turn the lights on:

(1) For departures — Before an aircraft taxies onto the runway and until it leaves the airport traffic area.

(2) For arrivals —

(a) IFR aircraft — Before the aircraft begins final approach, or

(b) VFR aircraft — Before the aircraft enters the airport traffic area, and

(c) Until the aircraft has taxied off the landing runway.

b. Between sunrise and sunset, turn the lights on as in a(1) and (2) above when the surface visibility is less than 2 miles.

c. As required by facility directives to meet local conditions.

d. Different from a., b., or c. above when:

(1) You consider it necessary, or

(2) Requested by a pilot and no other known aircraft will be adversely affected.

3-47d(2) Note. — Pilots may request lights to be turned on or off contrary to a., b., or c. above. However, FAR 121 and 135 operators are required to land/takeoff on lighted runways/heliport landing areas at night.

e. Do not turn on the runway edge lights when a NOTAM closing the runway is in effect.

3-47 Note. — Application concerns use for takeoffs/landings/approaches and does not preclude turning lights on for use of unaffected portions of a runway for taxiing aircraft, surface vehicles, maintenance, repair, etc.

3-47 Reference. — Order 7210.3 — 1252.

3-48 HIGH INTENSITY RUNWAY, RUNWAY CENTERLINE, AND TOUCHDOWN ZONE LIGHTS

Operate high intensity runway and associated runway centerline and touchdown zone lights in accordance with the Table, except:

a. Where a facility directive specifies other settings to meet local conditions.

b. As requested by the pilot.

c. As you deem necessary, if not contrary to pilot request.

3-48 Table. — HIRL, RCLS, TDZL Intensity Setting

Step	*Visibility*	
	Day	*Night*
5	Less than 1 mile*	When requested
4	1 to but not including 2 miles*	Less than 1 mile*
3	2 to but not including 3 miles	1 to but not including 3 miles*
2	When requested	3 to 5 miles inclusive
1	When requested	More than 5 miles

*and/or appropriate RVR/RVV equivalent.

3-49 HIRL ASSOCIATED WITH MALSR

Operate HIRL which control the associated MALSR in accordance with the accompanying intensity setting Table, except:

a. As requested by the pilot.

b. As you deem necessary, if not contrary to the pilot's request.

3-49 Table. — HIRL associated with MALSR

Step	*Visibility*	
	Day	*Night*
5	Less than 1 mile	When requested
4	1 to but not including 2 miles	Less than 1 mile
3	2 to but not including 3 miles	1 to but not including 3 miles
2	When requested	3 to 5 miles inclusive
1	When requested	More than 5 miles

3-49 Note. — When going from a given brightness step setting to a lower setting, rotation of the brightness control to a point below the intended step setting and then back to the appropriate step setting will ensure that the MALSR will operate at the appropriate brightness.

3-50 HIRL CHANGES AFFECTING RVR

Keep the appropriate approach controller or PAR controller informed, in advance if possible, of HIRL changes that affect RVR.

3-51 MEDIUM INTENSITY RUNWAY LIGHTS

Operate MIRL or MIRL which control the associated MALSR in accordance with the Table except:

a. As requested by the pilot.

b. As you deem necessary, if not contrary to the pilot's request.

3-51 Table. — MIRL Intensity Setting

Step	*Visibility*	
	Day	*Night*
3	Less than 2 miles	Less than 1 mile
2	2 to 3 miles	1 to 3 miles
1	When requested	More than 3 miles

3-51 Reference. — See 3-49 Note.

3-52 SIMULTANEOUS APPROACH AND RUNWAY EDGE LIGHT OPERATION

Turn on the runway edge lights for the runway in use whenever the associated approach lights are on. If multiple runway light selection is not possible, you may leave the approach lights on and switch the runway lights to another runway to accommodate another aircraft

3-52 Reference. — Runway Edge Lights, 3-47.

3-53 HIGH SPEED TURNOFF LIGHTS

Operate high speed turnoff lights:

a. Whenever the associated runway lights are used for arriving aircraft. Leave them on until the aircraft has either entered a taxiway or passed the last light.

b. As required by facility directives to meet local conditions.

c. As requested by the pilot.

3-54 TAXIWAY LIGHTS

Operate taxiway lights serving the taxiways, or portions thereof, in use as follows:

a. Between sunset and sunrise — Before an aircraft taxies onto the taxiway (normally at the time taxi information is issued) and until it taxies off it.

b. At other times when you consider it necessary and as required by local instructions.

3-55 OBSTRUCTION LIGHTS

If controls are provided, turn the lights on between sunset and sunrise.

3-56 ROTATING BEACON

If controls are provided, turn the rotating beacon on:

a. Between sunset and sunrise.

b. Between sunrise and sunset when the reported ceiling or visibility is below basic VFR minima.

3-57 thru 3-59 RESERVED

Section 5. RUNWAY SELECTION

3-60 SELECTION

Except where a "runway use" program is in effect, use the runway most nearly aligned with the wind when five knots or more or the "calm wind" runway when less than five knots (set tetrahedrons accordingly) unless use of another runway:

3-60 Note 1. — If a pilot prefers to use a runway different from that specified, he/she is expected to advise ATC.

3-60 Note 2. — At airports where a '"runway use" program is established, ATC will assign runways deemed to have the least noise impact. If in the interest of safety a runway different from that specified is preferred, the pilot is expected to advise ATC accordingly. ATC will honor such requests and advise pilots when the requested runway is noise sensitive.

3-60 Reference. — Order 8400.9, National Safety and Operational Criteria for Runway Use Programs.

a. Will be operationally advantageous.

b. Is requested by the pilot.

3-61 STOL RUNWAYS

Use STOL runways as follows:

a. A designated STOL runway may be assigned only when requested by the pilot or as specified in a letter of agreement with an aircraft operator.

b. Issue the measured STOL runway length if the pilot requests it.

3-62 TAILWIND COMPONENTS

When authorizing use of runways and a tailwind component exists, always state both wind direction and velocity.

3-62 Note. — The wind may be described as "calm" when appropriate.

3-62 Reference. — Calm Wind Condition, 2-104.

3-63 thru 3-69 RESERVED

Section 6. AIRPORT SURFACE DETECTION PROCEDURES

3-70 EQUIPMENT USAGE

Use ASDE to augment visual observation of aircraft and/or vehicular movements on runways and taxiways:

a. When visibility is less than the most distant point in the active movement area, and

b. When, in your judgment, its use will assist you in the performance of your duties at any time.

3-71 INFORMATION USAGE

a. Use ASDE-derived information:

(1) To determine that the runway is clear of aircraft and vehicles prior to a landing or departure.

3-71a(1) Reference. — Order 7210.3 - 371, Radar Use.

(2) To monitor compliance with control instructions by aircraft and vehicles on the taxiways and runways.

(3) To confirm pilot reported positions.

(4) To provide directional taxi information on pilot request.

Phraseology:

TURN (left/right) ON THE TAXIWAY/RUNWAY YOU ARE APPROACHING.

b. Do not provide specific navigational guidance (exact headings to be followed) unless an emergency exists or by mutual agreement with the pilot.

3-71b Note. — It remains the pilot's responsibility to navigate visually via routes to the clearance limit specified by the controller and to avoid other parked or taxiing aircraft, vehicles, or persons in the movement area.

3-72 IDENTIFICATION

To identify an observed target on the ASDE display, correlate its position with one or more of the following:

a. Pilot's report.

b. Controller's visual observation.

c. An identified target observed on the ASR bright display.

3-73 thru 3-79 RESERVED

Section 7. TAXI AND GROUND MOVEMENT PROCEDURES

3-80 GROUND TRAFFIC MOVEMENT

Issue by radio or directional light signals specific instructions which approve or disapprove the movement of aircraft, vehicles, equipment, or personnel on the movement area.

a. Do not issue *conditional* instructions that are dependent upon the movement of an arrival aircraft on or approaching the runway or a departure aircraft established on a takeoff roll. Do not say, "Taxi into position and hold behind landing traffic," or "Taxi/proceed across Runway Three Six behind departing/landing Jetstar." The above requirements do not preclude issuing instructions to follow an aircraft observed to be operating on the movement area in accordance with an ATC clearance/instruction and in such a manner that the instructions to follow are not ambiguous.

b. Do not use the word "cleared" in conjunction with authorization for aircraft to taxi or equipment/vehicle/personnel operations. Use the prefix "taxi," "proceed," or "hold," as appropriate, for aircraft instructions and "proceed" or "hold" for equipment/vehicles/personnel.

3-81. TAXI AND GROUND MOVEMENT OPERATION

When ground movement information is required, issue the following, as appropriate, in concise and easy to understand terms:

a. Route for the aircraft/vehicle to follow on the movement area.

3-81a Note. — Movement of aircraft or vehicles within loading, maintenance, or parking areas is the responsibility of the pilot, aircraft operator, or airport management.

Phraseology:

TAXI/PROCEED:

VIA (route),

or

ON (runway number or taxiway, etc.),

or

TO (location),

or

(direction),

or

ACROSS RUNWAY (runway number).

CONTINUE TAXIING OR PROCEED:

VIA (route),

or

ON (runway number or taxiway, etc.),

or

(direction).

3-81a Examples. —

"Turn right at first intersection."

"Taxi/proceed straight ahead to end of runway, then turn left."

b. Instructions to hold and traffic information as necessary.

3-81b Note 1. — When authorizing an aircraft to "taxi to" an assigned takeoff runway, the absence of holding instructions authorizes the aircraft to "cross" all runways which the taxi route intersects except the assigned takeoff runway. It does not include authorization to "taxi onto" or "cross" the assigned takeoff runway at any point. In absence of holding instructions, a clearance to "taxi to" any point other than an assigned takeoff runway is a clearance to cross all taxiways and runways that intersect the taxi route to that point.

3-81b Note 2. — Aircraft taxiing behind jet aircraft in freezing conditions may experience aggravated engine and airframe icing. For planning purposes be alert to pilot advisories that increased taxi intervals may be used.

Phraseology:

RUNWAY (number) TAXI/PROCEED

VIA (route if appropriate),

HOLD:

SHORT OF (runway number),

or

SHORT OF (location),

or

ON (taxi strip, runup pad, etc.),

and if necessary,

TRAFFIC (traffic information),

or

FOR (reason).

c. Instructions to expedite a taxiing aircraft or a moving vehicle.

Phraseology:

TAXI WITHOUT DELAY (traffic if necessary).

EXIT/PROCEED/CROSS (runway/taxiway) WITHOUT DELAY.

3-82 GROUND OPERATIONS

WAKE TURBULENCE APPLICATION

Avoid clearances which require:

a. Heavy jet aircraft to use greater than normal taxiing power.

b. Small aircraft or helicopters to taxi in close proximity to taxiing or hover-taxi helicopters.

3-82 Reference. — AC 90-23, Wake Turbulence, paragraphs 10 and 11.

3-83 RUNWAY PROXIMITY

Hold a taxiing aircraft clear of a runway as follows:

a. At established holding points marked by taxiway hold lines/signs.

b. If no hold lines/signs are established, instruct aircraft to hold short of a specific runway.

c. Issue traffic information as necessary.

3-83 Note. — Establishing hold lines/signs are the responsibility of the airport manager. Standards for accomplishing this are contained in Advisory Circulars 150/5340-1E and 150/5340-18A. Information on taxiway markings is published in the AIM.

3-83 Reference. — Taxi and Ground Movement Operation, 3/81; Altitude Restricted Low Approach, 3/128.

3-84 ILS CRITICAL AREAS

If an ILS critical area is marked and identifiable, restrict aircraft and surface vehicle operations, and provide information as follows when the ILS is being used for approach/landing guidance.

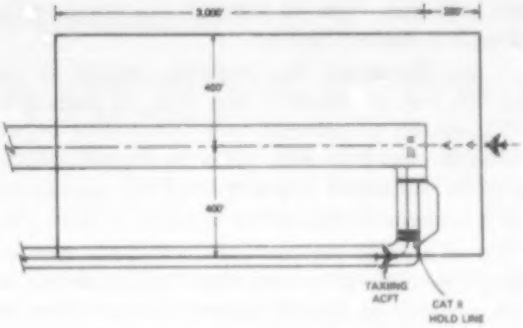
3-84 Note 1. — Restrictions to the operation of aircraft and vehicles are required to assure the integrity of ILS course signals and to meet obstacle clearance needs. Airport operators are responsible for installing and maintaining appropriate signs and markings delineating taxi lanes, hold lines, and no parking areas associated with ILS critical areas.

3-84 Note 2. — At USAF bases, the critical areas and the obstacle critical area (touchdown area) will be protected by an instrument hold line. An instrument hold line is marked only when a restriction short of the runway is necessary. See AFR 60-5 for the dimensions of the critical areas and the obstacle critical areas (touchdown areas).

3-84 NOTE 3. — For holding purposes, no point on the longitudinal axis of the aircraft is permitted past the hold line.

a. Obstacle Critical Area — A rectangular obstacle critical area surrounds the approach end of each Category II and Category III ILS runway. When conditions are reported ceiling less than 200 feet and/or RVR 2,000 or less *(USAF:* ½ if no RVR), do not authorize vehicles/aircraft to be in the area when an aircraft conducting an approach/missed approach enters/is over the area.

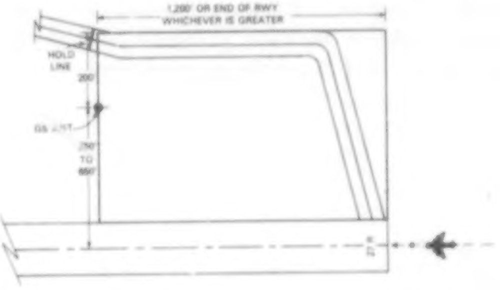
3-84a Note. — *USAF:* A rectangular obstacle critical area surrounds the approach end of each Category II/III ILS or PAR (with HAT below 200') runway.



3-84a(1) Illustration

b. Glide Slope Critical Area —

(1) *USAF NOT APPLICABLE.* When conditions are less than reported ceiling 800 feet and/or visibility 2 miles, do not authorize vehicles/aircraft to operate in the area when an arriving aircraft is inside the ILS FAF unless that aircraft has reported the airport in sight and is circling/sidestepping to land on other than the ILS runway.



3-84b(1) Illustration

3-84b(1) Note. — The glide slope critical area extends to the near edge of the runway that the ILS serves. It does not include the runway.

3-84b(1) Reference. — Order 6750.16.

(2) *USAF:* The following glide slope critical area procedures apply to CAT I and II ILS systems. See AFR 60-5 for the glide slope critical area dimensions.

(a) Whenever the reported ceiling is at or above 800 feet and visibility at or above 2 miles, permit all aircraft to proceed to the runway hold line.

(b) Whenever the reported ceiling is less than 800 feet or visibility less than 2 miles, but at or above 200 feet or visibility at or above ½ mile (RVR 2,400), restrict all aircraft larger than fighter type/size from proceeding beyond the instru-

ment hold line when an aircraft executing an ILS approach is inside the FAF.

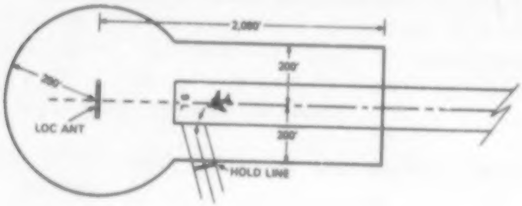
(c) Whenever the reported ceiling is less than 200 feet or visibility less than ½ mile (RVR 2,400), restrict all aircraft from proceeding beyond the instrument hold line when an aircraft executing an ILS approach is inside the FAF.

c. Localizer Critical Area —

(1) When conditions are less than reported ceiling 800 feet and/or visibility 2 miles, do not authorize vehicle or aircraft operations in or over the area when an arriving aircraft is between the ILS FAF and the airport, except:

(a) A preceding arriving aircraft on the same or another runway that passes over or through the area while landing or exiting the runway.

(b) A preceding departing aircraft or missed approach on the same or another runway that passes through or over the area.



3-84c(1) Illustration

(2) In addition to (1) above, when conditions are reported ceiling less than 200 feet and/or RVR 2,000 or less *(USAF:* ½ mile if no RVR), do not authorize vehicle or aircraft operations in or over the area when an arriving aircraft is inside the ILS MM *(USAF:* 1 NM from TD if no MM).

d. Glide Slope/Localizer Critical Area Advisories — When conditions are such that vehicle/aircraft restrictions in/over the areas are not required and an arriving aircraft advises the tower it will operate "Coupled" or "Autoland" or uses a similar phrase, promptly issue an advisory if a vehicle/aircraft will be in/over an area when the arriving aircraft is inside the ILS MM *(USAF:* 1 NM from TD if no MM).

Phraseology:

LOCALIZER/GLIDE SLOPE SIGNAL NOT PROTECTED.

3-85 thru 3-89 RESERVED

Section 8. SPACING AND SEQUENCING

3-90 SEQUENCE/SPACING APPLICATION

Establish the sequence of arriving and departing aircraft by requiring them to adjust flight or ground operation as necessary to achieve proper spacing.

Phraseology:

CLEARED FOR TAKEOFF.

CLEARED FOR IMMEDIATE TAKEOFF.

CLEARED FOR IMMEDIATE TAKEOFF OR HOLD SHORT (traffic).

CLEARED FOR IMMEDIATE TAKEOFF OR TAXI OFF THE RUNWAY

EXTEND DOWNWIND.

MAKE SHORT APPROACH.

USAF/USN: "MAKE SHORT APPROACH" (not applicable to USAF/USN fighter type aircraft.)

NUMBER (landing sequence number).

FOLLOW (description and location of traffic) *or, if traffic is utilizing another runway,* TRAFFIC IS (description and location) LANDING RUNWAY (number of runway being used).

CIRCLE THE AIRPORT

MAKE LEFT/RIGHT THREE-SIXTY/TWO SEVENTY.

GO AROUND.

CLEARED TO LAND.

CLEARED FOR:

TOUCH-AND-GO

or

STOP-AND-GO

or

LOW APPROACH

CLEARED FOR THE OPTION.

or

OPTION APPROVED

or

UNABLE OPTION, MAKE (specific type of approach/full stop landing)

or

UNABLE (type of option), OTHER OPTIONS APPROVED.

3-90 Note. — The "Cleared for the Option" procedure will permit an instructor pilot/flight examiner/pilot the option to make a touch-and-go, low approach, missed approach, stop-and-go, or full stop landing. This procedure will only be used at those locations with an operational control tower and will be subject to ATC approval

3-90 Reference. — Expeditious Compliance, 2-5.

3-91 TOUCH-AND-GO OR STOP-AND-GO OR LOW APPROACH

Consider an aircraft cleared for touch-and-go, stop-and-go, or low approach as an arriving aircraft until it touches down (for touch-and-go), or makes a complete stop (for stop-and-go), or crosses the landing threshold (for low approach), and thereafter as a departing aircraft.

3-92 SIMULTANEOUS SAME DIRECTION OPERATION

Authorize simultaneous, same direction operations on parallel runways, on parallel landing strips, or on a runway and a parallel landing strip only when the following conditions are met:

a. Operations are conducted in VFR conditions unless visual separation is applied.

b. Two-way radio communication is maintained with the aircraft involved and pertinent traffic information is issued.

c. The distance between the runways or landing strips is in accordance with the minima in the Table (use the greater minimum if two categories are involved).

3-92c. Table. — Same Direction Distance Minima

	Minimum distance (feet) between parallel	
Aircraft category	*Runway centerlines*	*Edges of adjacent strips or runway and strip*
Lightweight, single-engine, propeller-driven	300	200
Twin-engine, propeller-driven	500	400
All others	700	600

3-93 SIMULTANEOUS OPPOSITE DIRECTION OPERATION

Authorize simultaneous opposite direction operations on parallel runways, on parallel landing strips, or on a runway and a parallel landing strip only when the following conditions are met:

a. Operations are conducted in VFR conditions.

b. Two-way radio communication is maintained with the aircraft involved and pertinent traffic information is issued.

Phraseology:

TRAFFIC (description) LANDING/TAKING OFF/ LOW APPROACH. OPPOSITE DIRECTION ON PARALLEL RUNWAY/LANDING STRIP.

c. The distance between the runways or landing strips is in accordance with the minima in the Table.

3-93c. Table. — Opposite Direction Distance Minima

	Minimum distance (feet) between parallel	
Time of Operation	*Runway centerlines*	*Edges of adjacent strips or runway and strip*
Between sunrise and sunset	1,400	1,400
Between sunset and sunrise	2,800	Not authorized

WAKE TURBULENCE APPLICATION

d. Separate a Category I or II aircraft behind a nonheavy Category III aircraft taking off or making a low/missed approach when utilizing opposite direction takeoffs on the same runway by *3 minutes* unless a pilot has INITIATED a request to deviate from the *3-minute* interval. In the latter case, issue a wake turbulence advisory before clearing the aircraft for takeoff.

3-93d Note. — A request for takeoff does not initiate a waiver request; the request for takeoff must be accompanied by a request to deviate from the *3-minute* rule.

3-93d Reference. — Aircraft Categories, 106 Note 3/a.

e. Separate aircraft behind a heavy jet departing or making a low/missed approach when utilizing opposite direction takeoffs or landing on the same or parallel runways separated by less than 2,500 feet — *3 minutes.*

f. Inform an aircraft when it is necessary to hold in order to provide the required *3-minute* interval.

Phraseology:

HOLD FOR WAKE TURBULENCE.

3-94 thru 3-99 RESERVED

Section 9. DEPARTURE PROCEDURES AND SEPARATION

3-100 DEPARTURE INFORMATION

Provide current departure information, as appropriate, to departing aircraft. Departure information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS code. Runway, wind, and altimeter may be omitted if a pilot uses the phrase "have numbers." Issue departure information by including the following:

3-100 Note. — Pilot use of "have numbers" does not indicate receipt of the ATIS broadcast.

a. Runway in use.

b. Surface wind from direct readout dials. At LLWAS locations, centerfield wind from the LLWAS display.

c. Altimeter setting.

3-100c Reference. — Altimeter Settings, Chapter 2, Section 7.

d. Time, when requested.

e. Issue the official ceiling and visibility to a departing aircraft before takeoff as follows:

(1) To a VFR aircraft when weather is below VFR conditions. *USAF:* To VFR aircraft when ceiling is below 1,500 feet or visibility is less than 3 miles.

(2) To an IFR aircraft when weather is below VFR conditions or highest takeoff minima, whichever is greater.

3-100e(2) Note. — Standard takeoff minimums are published in FAR 91.116(c). Takeoff minima other than standard are prescribed for specific airports/runways and published in a tabular form supplement to the NOS instrument approach procedures charts and appropriate FAA Forms 8260.

f. Taxi information, as necessary. You need not issue taxi route information unless the pilot specifically requests it.

g. *USAF NOT APPLICABLE.* An advisory to "check density altitude" when appropriate.

3-100g Reference. — Order 7210.3 — 285, Broadcast Density Altitude Advisory.

h. Issue braking action for the runway in use as received from pilots or the airport management when Braking Action Advisories are in effect.

3-100h Reference. — Braking Action Advisories, 3-34. Glossary (Braking Action Advisories).

3-101 DEPARTURE DELAY INFORMATION

USA/USAF/USN NOT APPLICABLE

When gate-hold procedures are in effect, issue the following departure delay information as appropriate:

3-101 Reference. — Order 7210.3 — 1232, Gate Hold Procedures.

a. Advise departing aircraft the time at which the pilot can expect to receive engine startup advisory.

Phraseology:

EXPECT ENGINE STARTUP (time).

b. Advise departing aircraft when to start engines.

Phraseology:

START ENGINES, ADVISE READY TO TAXI

c. If the pilot requests to hold in another delay absorbing area, the request shall be approved if space and traffic conditions permit.

3-102 DEPARTURE CONTROL INSTRUCTIONS

Inform departing IFR and Stage III VFR aircraft of the following:

a. Before takeoff —

(1) Issue the appropriate departure control frequency and beacon code. The departure control frequency may be omitted if a SID has been or will be assigned and the departure control frequency is published on the SID.

Phraseology:

DEPARTURE FREQUENCY WILL BE (frequency), SQUAWK (code).

(2) Inform all departing IFR military turboprop/turbojet aircraft (except transport and cargo types) to change to departure control frequency. If the local controller has departure frequency override, transmit urgent instructions on this frequency. If the override capability does not exist, transmit urgent instructions on the emergency frequency.

Phraseology:

CHANGE TO DEPARTURE.

b. After takeoff —

(1) When the aircraft is about ½ mile beyond the runway end, instruct civil aircraft and military transport and cargo types to contact departure control provided further communication with you is not required.

(2) Do not request departing military turboprop/turbojet aircraft (except transport and cargo types) to make radio frequency or radar beacon changes before the aircraft reaches 2,500 feet above the surface.

3-103 TAKEOFF POSITION HOLD

a. You may authorize an aircraft to taxi into takeoff position and hold when takeoff clearance cannot be issued because of traffic. Issue traffic information to any aircraft so authorized. You may omit traffic information when the traffic is another aircraft which has landed on or is taking off on the same runway and is clearly visible to the holding aircraft. Do not use conditional phrases such as "behind landing traffic" or "after the departing aircraft."

Phraseology:

TAXI INTO POSITION AND HOLD.

If required,

(traffic information).

b. *USAF/USN:* Do not authorize aircraft to taxi into takeoff position to hold simultaneously on intersecting runways.

c. *USAF/USN:* When issuing additional instructions or information to an aircraft holding in takeoff position, include instructions to continue holding or taxi off the runway, unless it is cleared for takeoff.

Phraseology:

CONTINUE HOLDING,

or

TAXI OFF THE RUNWAY.

d. *USAF:* When an aircraft is authorized to taxi into takeoff position to hold, inform it of the closest traffic within 6 miles on final approach to the same runway. If the approaching aircraft is on a different frequency, inform it of the aircraft taxiing into position.

3-103d Reference. — Altitude Restricted Low Approach, 3-128.

3-104 ANTICIPATING SEPARATION

Takeoff clearance need not be withheld until prescribed separation exists if there is a reasonable assurance it will exist when the aircraft starts takeoff roll.

3-105 TRAFFIC INFORMATION — DEPARTING AIRCRAFT

USAF

When an aircraft is cleared for takeoff, inform it of the closest traffic within 6 miles on final approach to the same runway. If the approaching aircraft is on a different frequency, inform it of the departing aircraft.

3-106 SAME RUNWAY SEPARATION

Separate a departing aircraft from a preceding departing or arriving aircraft using the same runway by ensuring that it does not begin takeoff roll until:

a. The other aircraft has departed and crossed the runway end or turned to avert any conflict. If you can determine distances by reference to suitable landmarks, the other aircraft need only be airborne if the following minimum distance exists between aircraft:

(1) When only Category I aircraft are involved — *3,000 feet.*

(2) When a Category I aircraft is preceded by a Category II aircraft — *3,000 feet.*

(3) When either the succeeding or both are Category II aircraft — *4,500 feet.*

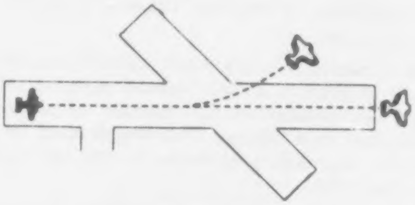
(4) When either is a Category III aircraft — *6,000 feet.*

3-106a Note. — Aircraft Categories are as follows:

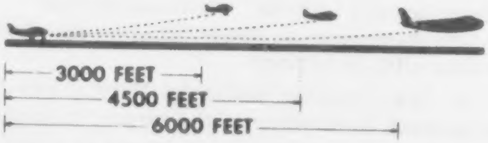
Category I — Light-weight, single-engine, personal-type propeller driven aircraft. (Does not include higher performance, single-engine aircraft such as the T-28.)

Category II — Light-weight, twin engine, propeller driven aircraft weighing 12,500 pounds or less, such as the Aero Commander, Twin Beechcraft, DeHavilland Dove, Twin Cessna. (Does not include such aircraft as a Lodestar, Learstar, or DC-3.)

Category III — All other aircraft such as the higher performance single-engine, large twin-engine, four engine, and turbojet aircraft.

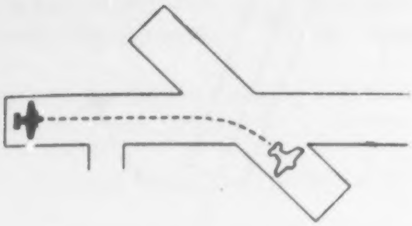


3-106a. Illustration 1



3-106a. Illustration 2

b. A preceding landing aircraft has taxied off the runway.



3-106b. Illustration

WAKE TURBULENCE APPLICATION

c. Do not issue clearances which imply or indicate approval of rolling takeoffs by heavy jet aircraft.

d. Do not issue clearances to a Category I or Category II aircraft to taxi into position and hold on the same runway behind a departing heavy jet aircraft to apply the necessary intervals.

3-106d Reference. — AC 90-23, Wake Turbulence.

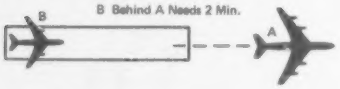
e. The minima in 5-72d may be applied in lieu of the 2-minute requirement in f below. When the 5-72d minima are applied, ensure that the appropriate radar separation exists at or prior to the time an aircraft becomes airborne when taking off behind a heavy jet.

3-106e Note. — The pilot may request additional separation; i.e., 2 minutes vs. 4 miles, but should make this request before taxiing on the runway.

f. Separate IFR/VFR aircraft taking off behind a heavy jet departure by *2 minutes,* when departing:

3-106f Note. — Takeoff clearance to the following aircraft should not be issued until *2 minutes* after the heavy jet begins takeoff roll.

(1) The same runway.



3-106f(1) Illustration

(2) A parallel runway separated by less than 2,500 feet.

g. Separate an aircraft from a heavy jet when operating on a runway with a displaced landing threshold if projected flight paths will cross — *2 minutes* when:

(1) A departure follows a heavy jet arrival.

(2) An arrival follows a heavy jet departure.

h. *USAF NOT APPLICABLE.* The *2 minute* minima need not be applied if the pilot of a departing IFR/VFR aircraft has initiated a request to deviate from the *2 minute* interval. In this case, issue a wake turbulence cautionary advisory before clearing the aircraft for takeoff.

3-107 INTERSECTION TAKEOFF

Handle intersection takeoffs as follows:

3-107 Reference. — Order 7210.3 — 209, Intersection Takeoffs.

a. You may initiate an intersection takeoff.

b. You may authorize an intersection takeoff if the pilot requests it.

c. Issue the measured distance from the intersection to the runway end to any pilot who requests it and to all military aircraft unless use of the intersection is covered in appropriate directives.

3-107c Note. — Exceptions are authorized where specific military aircraft routinely make intersection takeoffs and procedures are defined in appropriate directives. The authority exercising operational control of such aircraft ensures that all pilots are thoroughly familiar with these procedures, including the usable runway length from the applicable intersection.

Phraseology:

RUNWAY (runway number) INTERSECTION DEPARTURE.

If requested or required,

RUNWAY (runway number) INTERSECTION DEPARTURE, (remaining length) FEET AVAILABLE

WAKE TURBULENCE APPLICATION

d. Separate a Category I or II aircraft taking off from an intersection on the same runway (same or opposite direction takeoff) behind a preceding departing nonheavy Category III aircraft by ensuring that it does not start takeoff roll until at least *3 minutes* after Category III aircraft has taken off. Inform an aircraft when it is necessary to hold in order to provide the required 3-minute interval.

Phraseology:

HOLD FOR WAKE TURBULENCE.

e. The 3-minute interval is not required when:

(1) A pilot has INITIATED a request to deviate from that interval, or

3-107e(1) Note. — A request for takeoff does not initiate a waiver request; the request for takeoff must be accomplished by a request to deviate from the 3-minute interval.

(2) *USA/USAF NOT APPLICABLE.* The intersection is 500 feet or less from the departure point of the preceding aircraft and both aircraft are taking off in the same direction.

f. When applying the provisions of e:

(1) Issue a wake turbulence advisory before clearing the aircraft for takeoff.

(2) Do not clear the intersection departure for an immediate takeoff.

(3) When applying 107e(1) or 107e(2) above, issue a clearance to permit the trailing aircraft to deviate from course enough to avoid the flight path of the preceding nonheavy Category III departure.

(4) Separation requirements in accordance with 3-106a must also apply.

3-107e and f Reference. — Aircraft Categories, 3-106a. NOTE.

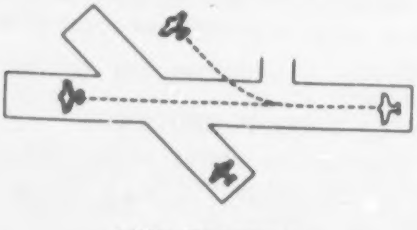
g. Separate an aircraft taking off from an intersection on the same runway (same or opposite direction takeoff) and parallel runways separated by less than 2,500 feet, by ensuring that it does not start takeoff roll until at least *3 minutes* after a heavy jet has taken off.

h. *USAF:* Separate a nonheavy aircraft taking off on the same runway behind a preceding departing A-300, B-747, C-5A, DC-10, or L-1011 by ensuring that it does not start takeoff roll until at least *4 minutes* after the preceding heavy jet has taken off.

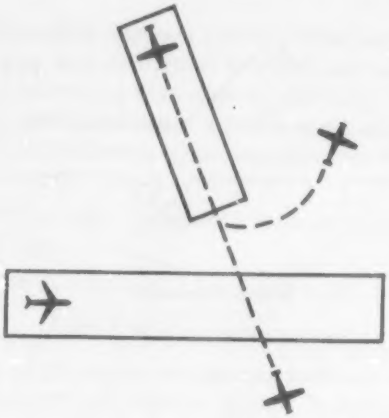
3-108 INTERSECTING RUNWAY SEPARATION

Separate departing aircraft from an aircraft using an intersecting runway, or nonintersecting runways when the flight paths intersect, by ensuring that the departure does not begin takeoff roll until one of the following exists:

a. The preceding aircraft has departed and passed the intersection, has crossed the departure runway, or is turning to avert any conflict.

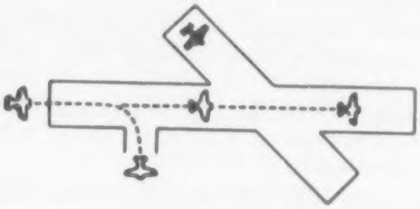


3-108a. Illustration 1

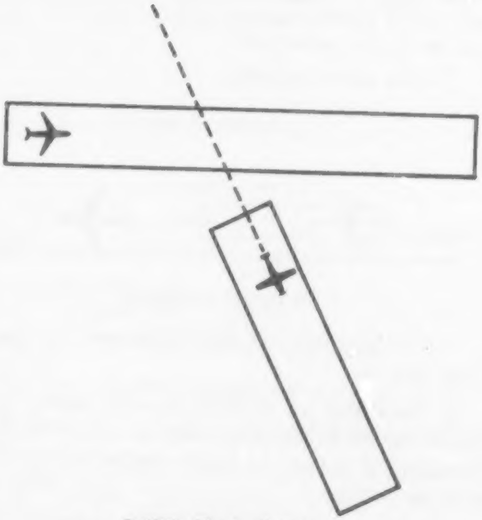


3-108a. Illustration 2

b. A preceding arriving aircraft has taxied off the landing runway, completed the landing roll and will hold short of the intersection, passed the intersection, or has crossed over the departure runway.



3-108b. Illustration 1



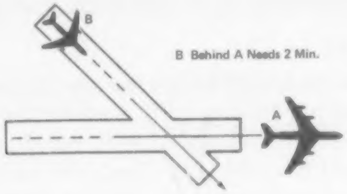
3-108b. Illustration 2

WAKE TURBULENCE APPLICATION

c. Separate IFR/VFR aircraft taking off behind a heavy jet departure by *2 minutes,* when departing:

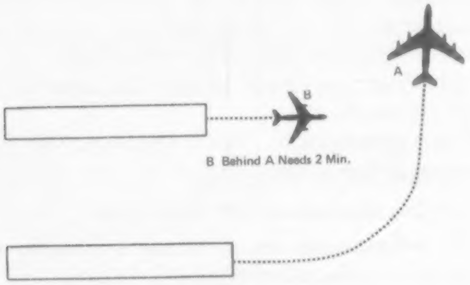
3-108c Note. — Takeoff clearance to the following aircraft should not be issued until 2 minutes after the heavy jet begins takeoff roll.

(1) Crossing runways if projected flight paths will cross.



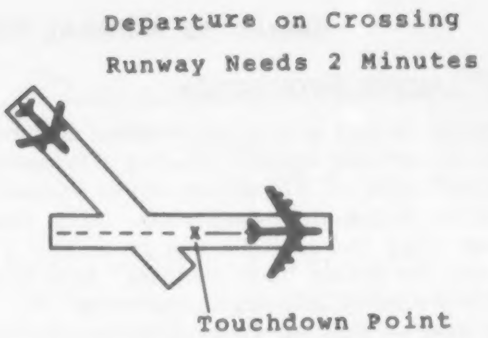
3-108c(1) Illustration

(2) A parallel runway separated by 2,500 feet or more if projected flight paths will cross.



3-108c(2) Illustration

d. Separate IFR/VFR aircraft departing behind a landing heavy jet on a crossing runway if the departure will fly through the airborne path of the arrival — *2 minutes.*



3-108d. Illustration

e. *USAF NOT APPLICABLE.* The *2-minute* minima need not be applied if the pilot of a departing IFR/VFR aircraft has initiated a request to deviate from the *2-minute* interval. In this case, issue a wake turbulence cautionary advisory before clearing the aircraft for takeoff.

3-109 TAKEOFF CLEARANCE

a. Issue takeoff clearance.

Phraseology:

CLEARED FOR TAKEOFF.

3-109a Note. — Turbine-powered aircraft may be considered ready for takeoff when they reach the runway, unless they advise otherwise.

3-109a Reference. — Departure Terminology, 4-20.

b. *USA/USAF/USN:* Issue surface wind and takeoff clearance to aircraft.

Phraseology:

WIND (surface wind in direction and velocity).

CLEARED FOR TAKEOFF.

3-110 CANCELLATION OF TAKEOFF CLEARANCE

Cancel a previously issued clearance for takeoff and inform the pilot of the reason if circumstances require.

Phraseology:

CANCEL TAKEOFF CLEARANCE (reason).

3-111 thru 3-119 RESERVED

Section 10. ARRIVAL PROCEDURES AND SEPARATION

3-120 LANDING INFORMATION

Provide current landing information, as appropriate, to arriving aircraft. Landing information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS code. Runway, wind, and altimeter may be omitted if a pilot uses the phrase "have numbers." Issue landing information by including the following:

2-120 Note. — Pilot use of "have numbers" does not indicate receipt of the ATIS broadcast.

a. Specific traffic pattern information (may be omitted if the aircraft is to circle the airport to the left).

Phraseology:

ENTER LEFT/RIGHT BASE. STRAIGHT-IN. MAKE STRAIGHT-IN. STRAIGHT-IN APPROVED. RIGHT TRAFFIC. MAKE RIGHT TRAFFIC. RIGHT TRAFFIC APPROVED. CONTINUE.

b. Runway in use.

c. Surface wind

(1) Surface wind from direct readout dials, or

(2) At LLWAS locations, centerfield wind from the LLWAS display, or

(3) Surface wind information from the LLWAS remote sensors (field boundary), and

(4) When an aircraft is being controlled by a controller not having surface wind for the airport concerned, relay surface wind information to the controller.

d. Altimeter setting.

3120d Reference. — Chapter 2, Section 7.

e. Any supplementary information

f. Clearance to land.

g. Requests for additional position reports. Use prominent geographical fixes which can be easily recognized from the air, preferably those depicted on sectional charts. This does not preclude the use of the legs of the traffic pattern as reporting points.

3-120g Note. — At some locations, VFR checkpoints are depicted on Sectional Aeronautical and Terminal Area Charts. In selecting geographical fixes, depicted VFR checkpoints are preferred unless the pilot exhibits a familiarity with the local area.

h. Ceiling and visibility if either is below basic VFR minima *(USAF:* If below 1,500 feet or 3 miles).

i. Low level wind shear advisories when available.

3-120i Reference. — Low Level Wind Shear Advisories, 3-8.

j. Issue braking action for the runway in use as received from pilots or the airport management when Braking Action Advisories are in effect.

3-120j Reference. — Braking Action Advisories, 3-34. Glossary (Braking Action Advisories).

3-121 FORWARDING APPROACH INFORMATION BY NONAPPROACH CONTROL FACILITIES

TERMINAL

a. Forward the following, as appropriate, to the control facility having IFR jurisdiction in your area. You may eliminate those items that, because of local conditions or situations, are fully covered in a letter of agreement or a facility directive.

(1) When an arriving aircraft is sighted and, in your judgment, landing is assured.

3-121a(1) Note. — "Landing assured" serves to alert the facility having IFR jurisdiction that landing of a particular aircraft is imminent via a direct flight to the runway. This allows the control facility to initiate preapproach action (vectors for positioning, etc.) of a subsequent arrival. It in no way serves to relieve the control facility of its separation responsibility.

(2) When you clear an arriving aircraft for a visual approach.

3-121a(2) Reference. — Visual Approach, 7-30.

(3) Aircraft arriving time.

(4) Cancellation of IFR flight plan.

(5) Information on a missed approach, unreported, or overdue aircraft.

(6) Runway in use.

(7) Weather as required.

3-121a(7) Reference. — Reporting Weather Conditions, 2-105.

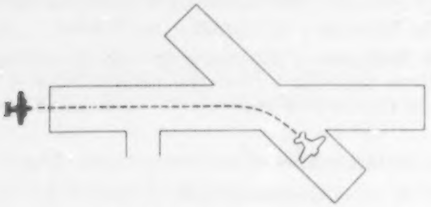
b. When the weather is below 1,000 feet or 3 miles *(USAF:* 1,500/3) or the highest circling minimums, whichever is greater, issue current weather to aircraft executing an instrument approach if it changes from that on the ATIS or that previously forwarded to the center/approach control.

3-122 SAME RUNWAY SEPARATION

a. Separate an arriving aircraft from another aircraft using the same runway by ensuring that the arriving aircraft does not cross the landing threshold until one of the following conditions exists or unless authorized in 3-131:

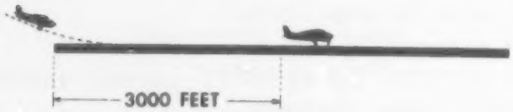
(1) The other aircraft has landed and taxied off the runway. Between sunrise and sunset, if you can determine distances by reference to suitable landmarks and the other aircraft has landed, it

need not be clear of the runway if the following minimum distance from the landing threshold exists:



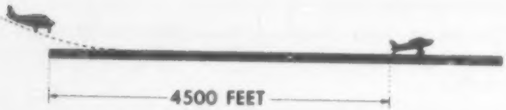
3-122a(1). Illustration

(a) When a Category I aircraft is landing behind a Category I or II — *3,000 feet.*



3-122a(1)(a) Illustration

(b) When a Category II aircraft is landing behind a Category I or II — *4,500 feet.*



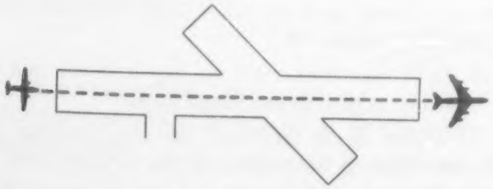
3-122a(1)(b) Illustration

(2) The other aircraft has departed and crossed the runway end. If you can determine distances by reference to suitable landmarks and the other aircraft is airborne, it need not have crossed the runway end if the following minimum distance from the landing threshold exists:

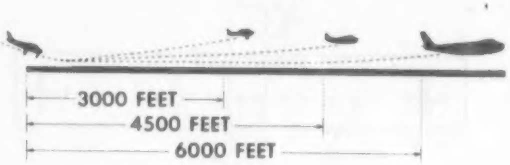
(a) Category I aircraft landing behind Category I or II — *3,000 feet.*

(b) Category II aircraft landing behind Category I or II — *4,500 feet.*

(c) When either is a category III aircraft — *6,000 feet.*



3-122a(2) Illustration 1



3-122a(2) Illustration 2

WAKE TURBULENCE APPLICATION

b. Issue wake turbulence cautionary advisories and the position, altitude if known, and direction of flight of the heavy jets to aircraft landing behind a departing/arriving heavy jet on the same or parallel runways separated by less than 2,500 feet.

3-122b Reference. — AC 90-23D, Pilot Responsibility, paragraph 12.

3-122b Example 1. —

"Cleared to land Runway Two Seven Left, caution wake turbulence, heavy Boeing 747 departing Runway Two Seven Right."

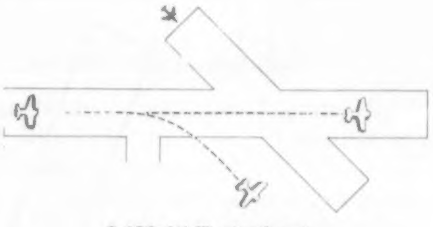
3-122b Example 2. —

"Number two to land, following a heavy Lockheed C5A on two-mile final. Caution wake turbulence."

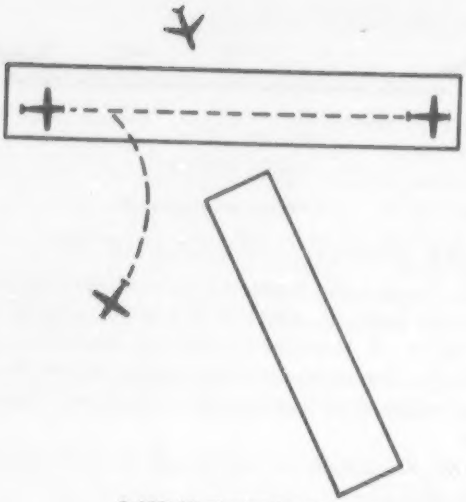
3-123 INTERSECTING RUNWAY SEPARATION

a. Separate an arriving aircraft using one runway from another aircraft using an intersecting runway or a nonintersecting runway when the flight paths intersect by ensuring that the arriving aircraft does not cross the landing threshold or flight path of the other aircraft until one of the following conditions exists:

(1) The preceding aircraft has departed and passed the intersection/flight path or is airborne and turning to avert any conflict.

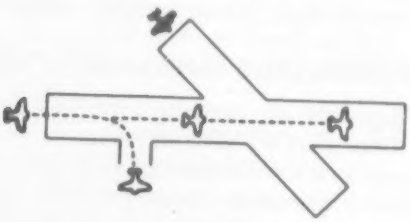


3-123a(1) Illustration 1

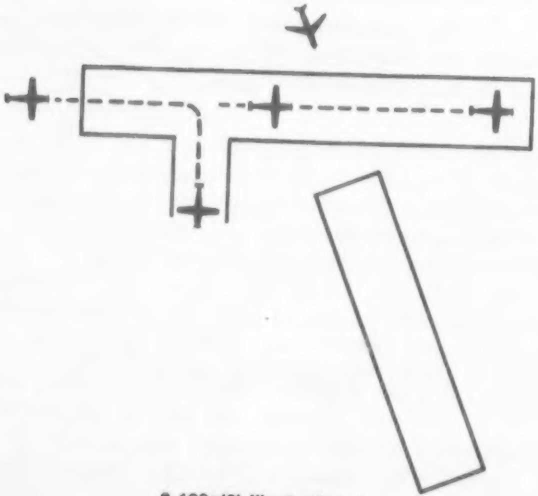


3-123a(1) Illustration 2

(2) A preceding arriving aircraft has taxied off the landing airway, completed landing roll and will hold short of the intersection/flight path, or has passed the intersection/flight path.



3-123a(2) Illustration 1



3-123a(2) Illustration 2

b. *USAF/USN NOT APPLICABLE.* Where approved by the air traffic manager and in accordance with a facility directive, you may authorize an aircraft to takeoff from one runway and another aircraft to land simultaneously on an intersecting runway or an aircraft to land on one runway and another aircraft to land simultaneously on an intersecting runway, as follows:

3-123b Note. — Application of these procedures does not relieve controllers from the responsibility of providing other appropriate separation contained in this handbook.

3-123b Reference. — FAA Order 7210.3 — 1227.

(1) A simultaneous takeoff and landing operation may be conducted only in VFR conditions between sunrise and sunset.

(2) Instruct the landing aircraft to hold short of the intersecting runway being used by the aircraft taking off. In the case of simultaneous landings and no operational benefit is lost, restrict the aircraft in the lesser Group.

Phraseology:

HOLD SHORT OF RUNWAY (runway number), (traffic or other information).

3-123b(2) Note. — Pilots who prefer to use the full length of the runway or a runway different from that specified are expected to advise ATC prior to landing.

(3) Issue traffic information to both aircraft involved and obtain an acknowledgement from each.

3-123b Example 1. —

"Cleared to land Runway One Eight, hold short of Runway One Four Left, traffic landing Runway One Four Left."

"Cleared to land Runway One Four Left, traffic landing Runway One Eight will hold short of the intersection."

3-123b Example 2. —

"Cleared to land Runway Three Six, hold short of Runway Three Three, traffic departing Runmway Three Three."

"Traffic landing Runway Three Six will hold short of the inersection, cleared for takeoff."

(4) If requested by either aircraft, issue the measured distance from the landing threshold to the intersection.

3-123b(4) Example. —

"Distance from the landing threshold of Runway One Eight to the intersection of Runway One Four Left is six thousand feet."

(5) The conditions in (2), (3), and (4) shall be met in sufficient time for the pilots to take other action if desired and no later than the time landing clearance is issued.

(6) Both runways must be dry with no reports that braking action is less than good.

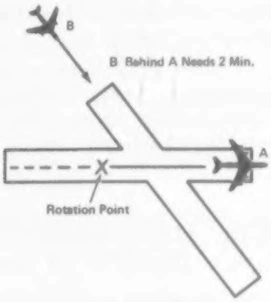
(7) There is no tailwind for the landing aircraft restricted to hold short of the intersection.

(8) The aircraft restricted to hold short is listed in Appendix B.

(9) STOL aircraft operations are in accordance with a letter of agreement with the aircraft operator/pilot, the aircraft is listed as a Group 1 in Appendix B, or the pilot confirms that it is a STOL aircraft.

WAKE TURBULENCE APPLICATION

c. Separate IFR/VFR aircraft landing behind a departing heavy jet on a crossing runway if the arrival will fly through the airborne path of the departure - *2 minutes* or the appropriate radar separation minima.

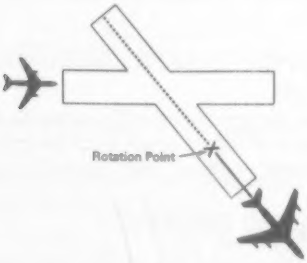


3-123c. Illustration

d. Issue wake turbulence cautionary advisories and the position, altitude if known, and direction of flight of the heavy jets to:

3-123d Reference. — AC 90-23D, Pilot Responsibility, paragraph 12.

(1) Aircraft landing on crossing runways behind a departing heavy jet if the arrival flight path will cross the takeoff path behind the heavy jet and behind the heavy jet rotation point.

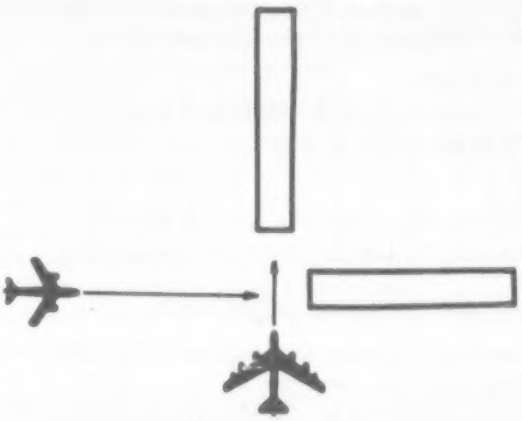


3-123d(1). Illustration

3-123d(1) Example. —

"Cleared to land Runway Niner. Caution wake turbulence, heavy C141 departing Runway One Five."

(2) VFR aircraft landing on a crossing runway behind an arriving heavy jet if the arrival flight path will cross.



3-123d(2) IllustrationS

3-123d(2) Example. —

"Cleared to land Runway Niner. Caution wake turbulence, heavy Boeing 747 land Runway Three Six."

3-124 WHEELS DOWN CHECK

USA/USAF/USN

Remind aircraft to check wheels down when it reaches an appropriate position in the pattern unless the pilot has previously reported wheels down.

Phraseology:

CHECK WHEELS DOWN.

3-124 Note. — The intent is solely to remind the pilot to lower the wheels — not to place responsibility on the controller.

3-125 WIND INFORMATION

USA/USAF/USN

Issue surface wind when clearing aircraft for touch-and-go, stop-and-go, low approach, or the option.

3-126 LANDING CLEARANCE

Issue landing clearance. Restate the landing runway whenever there is a possibility of a conflict with another aircraft which is using or planning to use another runway, or an instrument approach is being conducted to a closed runway.

Phraseology:

CLEARED TO LAND,

or

CLEARED TO LAND RUNWAY (designator).

USA/USAF/USN

Issue surface wind and landing clearance. Restate the landing runway whenever there is a pos-

sibility of a conflict with another aircraft which is using or is planning to use another runway.

Phraseology:

WIND (surface wind direction and velocity),
CLEARED TO LAND,

or

WIND (surface wind direction and velocity),
CLEARED TO LAND RUNWAY (designator).

3-127 ANTICIPATING SEPARATION

Landing clearance to a succeeding aircraft in a landing sequence need not be withheld if you observe the positions of the aircraft and determine that prescribed runway separation will exist when the aircraft cross the landing threshold. Issue traffic information to the succeeding aircraft.

3-127 Example. —

"Delta Forty-two cleared to land. Traffic is Eastern DC-9 over approach lights."

3-128 LANDING CLEARANCE WITHOUT VISUAL OBSERVATION

When an arriving aircraft reports at a position where he should be seen but has not been visually observed, advise the aircraft as a part of the landing clearance that it is not in sight and restate the landing runway.

Phraseology:

NOT IN SIGHT, CLEARED TO LAND RUNWAY (designator).

3-128 Note. — Aircraft observance on the BRITE radar display satisfies the visually observed requirement.

3-129 WITHHOLDING LANDING CLEARANCE

Do not withhold a landing clearance indefinitely even though it appears a violation of FAR has been committed. The apparent violation might be the result of an emergency situation. In any event, assist the pilot to the extent possible.

3-130 RUNWAY EXITING

When appropriate, instruct aircraft where to turnoff runway after landing.

Phraseology:

TURN LEFT/RIGHT (turning point),

or

IF ABLE, TURN LEFT/RIGHT (turning point.)

3-130 Note. — It is not intended that runway exiting or taxi instructions normally be issued to airborne aircraft prior to landing.

3-131 ALTITUDE RESTRICTED LOW APPROACH

A low approach with an altitude restriction of not less than 500 feet above the airport may be authorized except over an aircraft in takeoff position or a departure aircraft. Do not clear aircraft for restricted altitude low approaches over personnel unless airport authorities have advised these personnel that the approaches will be conducted. Advise the approaching aircraft of the location of applicable ground traffic, personnel, or equipment.

3-131 Note 1. — The 500 feet restriction is a minimum. Higher altitudes should be used when warranted. For example, 1,000 feet is more appropriate for heavy aircraft operating over unprotected personnel or small aircraft on or near the runway.

3-131 Note 2. — This authorization includes altitude restricted low approaches over preceding landing or taxiing aircraft. Restricted low approaches are not authorized over aircraft in takeoff position or departing aircraft.

Phraseology:

CLEARED FOR LOW APPROACH AT OR ABOVE (altitude). TRAFFIC IS (description and location).

3-131 Reference. — Vehicles/Equipment/Personnel on Runways, 3-5; Traffic Information, 3-6; Light Signals, 3-20; Timely Information, 3-32 Takeoff Position Hold, 3-103; Same Runway Separation, 3-123.

3-132 CLOSED TRAFFIC

Approve/disapprove pilot requests to remain in closed traffic for successive operations subject to local traffic conditions.

Phraseology:

LEFT/RIGHT (if required) CLOSED TRAFFIC APPROVED. REPORT (position if required),

or

UNABLE CLOSED TRAFFIC, (additional information as required).

3-132 Note. — Segregated traffic patterns for helicopters to runways and other areas may be established by letter of agreement or other local operating procedures.

3-133 OVERHEAD APPROACH

Issue the following to arriving military aircraft that will conduct an overhead approach:

a. Pattern altitude and direction of traffic. Omit either or both if standard or when you know the pilot is familiar with a nonstandard procedure.

Phraseology:

PATTERN ALTITUDE (altitude). RIGHT TURNS.

b. Request for report on initial approach.

Phraseology:

REPORT INITIAL.

c. "Break" information and request for pilot report. Specify the point of "break" only if nonstandard. Request the pilot to report "break" if required for traffic or other reasons.

Phraseology:

BREAK AT (specified point).

REPORT BREAK.

3-133 Note 1. — Ordinarily, at airports where military aircraft are based, standard overhead approach patterns are developed. These patterns generally specify:

a. Radio contact/s required of the pilot.

b. Speed/s to be maintained throughout the approach.

c. An initial approach three to five miles in length.

d. An elliptical pattern consisting of two 180 degree turns.

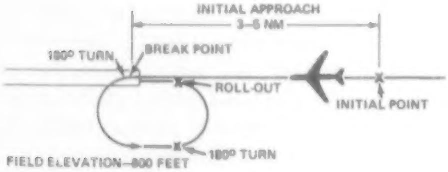
e. A "break" point at which the first 180 degree turn is started.

f. Direction of turns (in some instances opposite those of the conventional pattern).

g. Altitude/s (at least 500 feet above the conventional pattern) to be maintained until the second 180 degree turn is started.

h. A "roll-out" on final approach not less than ¼ miles from the landing threshold and not less than 300 feet above the ground.

3-133 Note 2. — The existence of a standard overhead approach pattern does not eliminate the possible requirement for an aircraft to conform to conventional rectangular patterns if an overhead approach cannot be approved.



This illustration depicts a standard overhead approach:

a. Enter initial approach at 2,300 m.s.l.

b. Left turn at "break" point.

c. Maintain 2,300 m.s.l. until starting second 180 degree turn.

d. Roll-out on final approach not less than ¼ nm from landing threshold.

3-133 Illustration

3-133 Examples. —

"Air Force Three Six Eight, Runway Six, wind zero seven zero at eight, pattern altitude six thousand, report initial."

"Air Force Three Six Eight, break at midfield, report break"

"Air Force Three Six Eight, cleared to land."

"Alfa Kilo Two Two, Runway Three One, wind three three zero at one four, right turns, report initial."

"Alfa Kilo Two Two, report break."

"Alfa Kilo Two Two, cleared to land."

d. When an overhead pattern could extend into the path of a departing or a missed approach aircraft, timely and positive controller action is required to prevent a conflict. When frequency of occurrence warrants, local procedures and/or coordination requirements should be set forth in an appropriate letter of agreement, facility directive, base flying manual, etc.

3-134 SIMULATED FLAMEOUT OPERATIONS/ PRACTICE PRECAUTIONARY APPROACHES

Military aircraft may be authorized to make SFO/practice precautionary approaches if the following conditions are met:

3-134 Note. — Practice precautionary/flameout approaches are authorized only for specific aircraft. Precautionary approaches, however, might be made by any aircraft when engine failure is considered possible. The practice precautionary approach maneuvering area/altitudes may not conform to the standard flameout maneuvering area/altitudes.

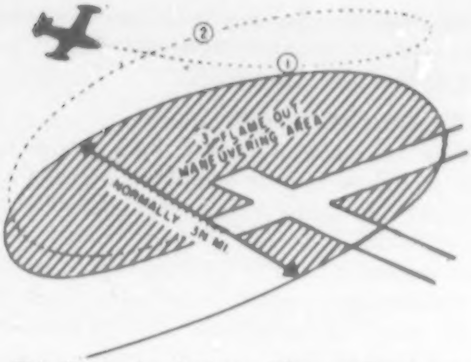
3-134 Reference. — Order 7610.4 — 1560.

a. A letter of agreement for the operation is in effect between the control tower, approach control, and other adjacent facilities as required.

b. Traffic information on aircraft in radio communication with or visible to you within or adjacent to the flameout maneuvering area is exchanged between the SFO and other concerned aircraft.

c. The exchange or issuance of traffic information as agreed to in any interfacility letter of agreement is accomplished.

d. The high-key altitude or practice precautionary approach maneuvering altitudes of the aircraft concerned are obtained prior to approving the approach.



This illustration depicts a "flameout" maneuver:

1. High Key—That position over the airport where the pilot begins to maneuver the aircraft to enter a high downwind leg.

2. Low Key—That position on high downwind leg just before turning on base leg.

3. "Flameout" Maneuvering Area—That airspace, to be occupied by an aircraft practicing "flameout" procedures, which begins at the high key, includes the low key, and ends at the landing threshold.

3-134 Illustration

3-135 thru 3-139 RESERVED

Section 11. HELICOPTER OPERATIONS

3-140 TAXI AND GROUND MOVEMENT OPERATION

a. When necessary for a wheeled helicopter to taxi on the surface, use the phraseology in paragraph 3-81.

3-140a Note. — Ground taxiing uses less fuel than hover-taxiing and minimizes air turbulence. However, under certain conditions, such as rough, soft, or uneven terrain, it may become necessary to hover/air-taxi for safety considerations. Helicopters with articulating rotors (usually designs with three or more main rotor blades) are subject to "ground resonance" and may, on rare occasions, suddenly lift off the ground to avoid severe damage or destruction.

b. When requested or necessary for a helicopter/VTOL aircraft to proceed at a slow speed above the surface, normally below 20 knots and in ground effect, use the following phraseology, supplemented as is appropriate with the phraseology in paragraph 3-81.

Phraseology:

HOVER-TAXI (supplemented, as appropriate, from paragraph 3-81,

CAUTION (dust, blowing snow, loose debris, taxiing light aircraft, personnel, etc.).

3-140b Note. — Hover-taxiing consumes fuel at a high burn rate, and helicopter downwash turbulence (produced in ground effect) increases significantly with larger and heavier helicopters.

3-140b References. — Glossary (Hover-Taxi), AIM.

c. When requested or necessary for a helicopter to proceed expeditiously from one point to another, normally below 100 feet AGL and at airspeeds above 20 knots, use the following phraseology, supplemented as is appropriate with the phraseology in paragraph 3-81.

Phraseology:

AIR-TAXI:

VIA (direct, as requested, or specified route)

TO (location, heliport, helipad, operating/movement area, active/inactive runway).

If required,

REMAIN AT OR BELOW *(altitude).*

CAUTION *(wake turbulence or other reasons above).*

LAND AND CONTACT TOWER,

or

HOLD FOR (reason — takeoff clearance, release, landing/taxiing aircraft, etc.)

3-140c Note. — Air-taxi is the preferred method for helicopter movements on airports provided ground operations/conditions permit. Air-taxi authorizes the pilot to proceed above the surface either via hover-taxi or flight at speeds more than 20 knots. Unless otherwise requested or instructed, the pilot is expected to remain below 100 feet AGL. The pilot is solely responsible for selecting a safe airspeed for the altitude/operation being conducted.

3-140c Reference. — Glossary (Air-Taxi); AIM.

WAKE TURBULENCE APPLICATION

d. Avoid clearances which require small aircraft or helicopters to taxi in close proximity to taxiing or hover-taxi helicopters.

3-140 Reference. — AC 90-23, Wake Turbulence, paragraphs 10 and 11.

3-141 HELICOPTER TAKEOFF CLEARANCE

a. Issue takeoff clearance from movement areas other than active runways, or in diverse directions from active runways, with additional instructions, as necessary. Whenever possible, issue takeoff clearance in lieu of extended hover-taxi or air-taxi operations.

Phraseology:

CLEARED FOR TAKEOFF FROM (present position, taxiway, helipad, numbers). MAKE RIGHT/LEFT TURN FOR (direction, points of compass, heading, NAVAID radial) DEPARTURE/DEPARTURE ROUTE (number, name, or code).

AVOID (taxiing aircraft/vehicles/personnel),

or

REMAIN (direction) OF (active runways, parking areas, passenger terminals, etc.).

CAUTION (power lines, unlighted obstructions, trees, wake turbulence, etc.).

b. If takeoff is requested from nonmovement areas and, in your judgment, the operation appears to be reasonable, use the following phraseology instead of the takeoff clearance in a. above.

Phraseology:

PROCEED AS REQUESTED, USE CAUTION (reason and additional instructions, as appropriate).

c. If takeoff is requested from an area not visible, an area not authorized for helicopter use, an unlighted area at night, or an area off the airport, and traffic is not a factor, use the following phraseology.

Phraseology:

DEPARTURE FROM (requested location) WILL BE AT YOUR OWN RISK (reason and additional instructions, as necessary).

TRAFFIC (as applicable),

or

TRAFFIC NOT A FACTOR.

d. Unless requested by the pilot, do not issue downwind takeoffs if the tailwind exceeds 5 knots.

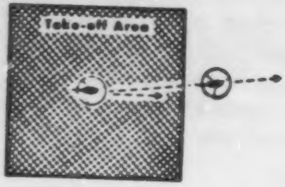
3-141d Note. — A pilot request to takeoff from a given point in a given direction constitutes such a request.

3-142 HELICOPTER DEPARTURE SEPARATION

Separate a departing helicopter from other helicopters by ensuring that it does not takeoff until one of the following conditions exists:

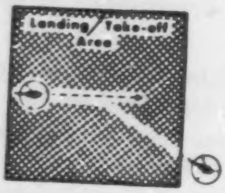
3-142 Note. — Helicopters performing air-taxiing operations within the boundary of the airport are considered to be taxiing aircraft.

a. A preceding, departing helicopter has left the takeoff area.



3-142a. Illustration

b. A preceding, arriving helicopter has taxied off the landing area.

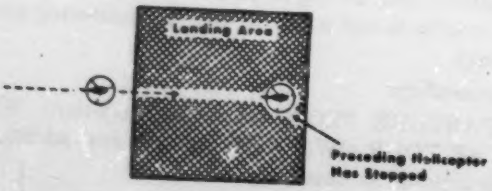


3-142b. Illustration

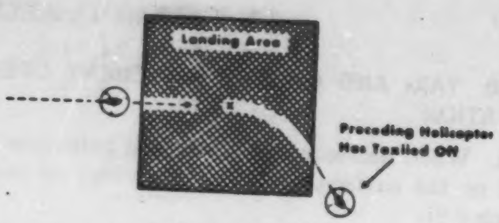
3-143 HELICOPTER ARRIVAL SEPARATION

Separate an arriving helicopter from other helicopters by ensuring that it does not land until one of the following conditions exists:

a. A preceding, arriving helicopter has come to a stop or taxied off the landing area.

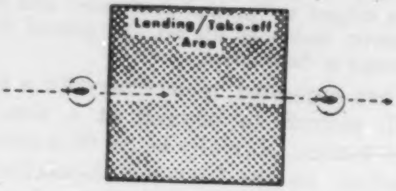


3-143a. Illustration 1



3-143a. Illustration 2

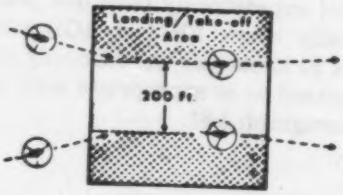
b. A preceding, departing helicopter has left the landing area.



3-143b. Illustration

3-144 SIMULTANEOUS LANDINGS OR TAKE-OFFS

Authorize helicopters to conduct simultaneous landings or takeoffs if the distance between the landing or takeoff points is at least 200 feet and the courses to be flown do not conflict. Refer to surface markings to determine the 200-foot minimum, or instruct a helicopter to remain at least 200 feet from another helicopter.



3-144 Illustration

3-145 HELICOPTER LANDING CLEARANCE

a. Issue landing clearance for helicopters to movement areas other than active runways, or from diverse directions to points on active runways, with additional instructions, as necessary. Whenever possible, issue landing clearance in lieu of extended hover-taxi or air-taxi operations.

Phraseology:

MAKE APPROACH STRAIGHT-IN/CIRCLING LEFT/RIGHT TURN TO (location, runway, taxiway, helipad, Maltese cross) ARRIVAL/ARRIVAL ROUTE (number, name, or code).

HOLD SHORT OF (active runway, extended runway centerline, other).

REMAIN (direction/distance; e.g., 700 feet/1 ½ miles) FROM (runway, runway centerline, other helicopter/aircraft).

CAUTION (power lines, unlighted obstructions, wake turbulence, etc.).

CLEARED TO LAND.

CONTACT GROUND.

AIR TAXI TO RAMP.

b. If landing is requested to nonmovement areas and, in your judgment, the operation appears to be reasonable, use the following phraseology instead of the landing clearance in a. above.

Phraseology:

PROCEED AS REQUESTED, USE CAUTION (reason and additional instructions, as appropriate).

c. If landing is requested to an area not visible, an area not authorized for helicopter use, an unlighted area at night, or an area off the airport, and traffic is not a factor, use the following phraseology.

Phraseology:

LANDING AT (requested location) WILL BE AT YOUR OWN RISK (reason and additional instructions, as necessary).

TRAFFIC (as applicable),

or

TRAFFIC NOT A FACTOR.

d. Unless requested by the pilot, do not issue downwind landings if the tailwind exceeds 5 knots.

3-145d Note. — A pilot request to land at a given point from a given direction constitutes such a request.

3-146 thru 3-149 RESERVED

READEX FICHE

Section 12. SEA LANE OPERATIONS

3-150 APPLICATION

Where Sea Lanes are established and controlled, apply the provisions of this section.

3-151 DEPARTURE SEPARATION

Separate a departing aircraft from a preceding departing or arriving aircraft using the same sea lane by ensuring that it does not commence takeoff until:

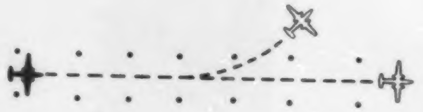
a. The other aircraft has departed and crossed the end of the sea lane or turned to avert any conflict. If you can determine distances by reference to suitable landmarks, the other aircraft need only be airborne if the following minimum distance exists between aircraft:

(1) When only Category I aircraft are involved - *1,500 feet.*

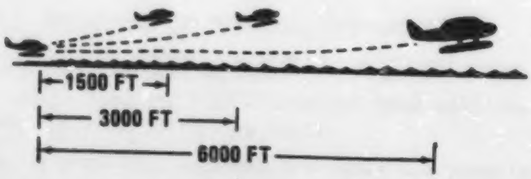
(2) When a Category I aircraft is preceded by a Category II aircraft - *3,000 feet.*

(3) When either the succeeding or both are Category II aircraft - *3,000 feet.*

(4) When either is a Category III aircraft - *6,000 feet.*



3-151a. Illustration 1.



3-151a. Illustration 2.

b. A preceding landing aircraft has taxied out of the sea lane.

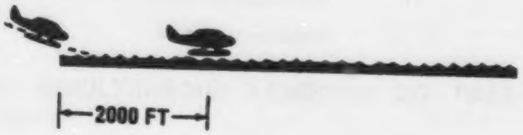
3-151 Note. — Due to the absence of braking capability, caution should be exercised when instructing a float plane to hold a position as the aircraft will continue to move because of prop generated thrust. Clearance to taxi into position and hold should, therefore, be followed by takeoff or other clearance as soon as practicable.

3-152 ARRIVAL SEPARATION

Separate an arriving aircraft from another aircraft using the same sea lane by ensuring that the arriving aircraft does not cross the landing threshold until one of the following conditions exists:

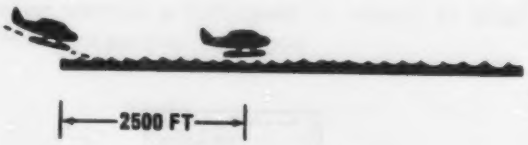
a. The other aircraft has landed and taxied out of the sea lane. Between sunrise and sunset, if you can determine distances by reference to suitable landmarks and the other aircraft has landed, it need not be clear of the sea lane if the following minimum distance from the landing threshold exists:

(1) When a Category I aircraft is landing behind a Category I or II — *2,000 feet.*



3-152a(1) Illustration

(2) When a Category II aircraft is landing behind a Category I or II — *2,500 feet.*



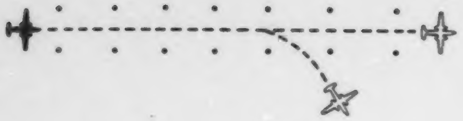
3-152a(2) Illustration

b. The other aircraft has departed and crossed the end of the sea lane or turned to avert any conflict. If you can determine distances by reference to suitable landmarks and the other aircraft is airborne, it need not have crossed the end of the sea lane if the following minimum distance from the landing threshold exists:

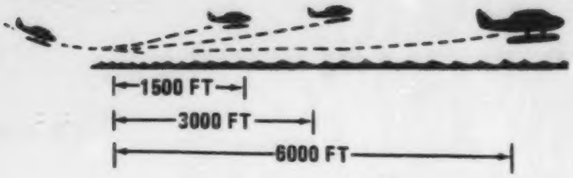
(1) When only Category I aircraft are involved — *1,500 feet.*

(2) When either is a Category II aircraft — *3,000 feet.*

(3) When either is a Category III aircraft — *6,000 feet.*



3-152b. Illustration 1


1500 FT
3000 FT
6000 FT

3-152b. Illustration 2

[illegible]

[illegible]

[illegible]

TABLE OF CONTENTS

Page

Chapter 4. IFR

Section 1. NAVAID USE LIMITATIONS

4-1 Altitude and Distance Limitations 4-1
4-2 Exceptions 4-1
4-3 Crossing Altitude 4-1
4-4 VFR-On-Top 4-2
4-5 Fix Use 4-2
4-6—4-9 Reserved 4-2

Section 2. CLEARANCES

4-10 Clearance Items 4-3
4-11 Clearance Prefix 4-3
4-12 Delivery Instructions 4-3
4-13 Clearance Relay 4-3
4-14 Route or Altitude Amendments 4-3
4-15 Through Clearances 4-3
4-16 ALTRV Clearance 4-4
4-17 IFR-VFR and VFR-IFR Flights 4-4
4-18—4-19 Reserved 4-4

Section 3. DEPARTURE PROCEDURES

4-20 Departure Terminology 4-5
4-21 Departure Clearances 4-5
4-22 Abbreviated Departure Clearance 4-6
4-23 Departure Restrictions and Clearance Void/Release Times 4-8
4-24 Delay Sequencing 4-8
4-25 Forward Departure Delay Information 4-8
4-26 Coordination with Receiving Facility 4-8
4-27 VFR Departure of IFR Departure 4-8
4-28 Forwarding Departure Times 4-8
4-29 Reserved 4-8

Section 4. ROUTE ASSIGNMENT

4-30 Route Use 4-9
4-31 Route Structure Transitions 4-9
4-32 Degree-Distance Route Definition USAF/USN 4-10
4-33 Alternative Routes 4-10
4-34 Uncontrolled Airspace 4-10
4-35—4-39 Reserved 4-10

Section 5. ALTITUDE ASSIGNMENT AND VERIFICATION

4-40 Flight Direction 4-11
4-41 Exceptions 4-11
4-42 Lowest Usable Flight Level 4-11
4-43 Adjusted Minimum Flight Level 4-11
4-44 Minimum En Route Altitudes 4-12
4-45 Altitude Information 4-12
4-46 Anticipated Altitude Changes 4-13
4-47 Altitude Verification Non-Automatic Altitude Reporting 4-13
4-48—4-49 Reserved 4-14

TABLE OF CONTENTS—Continued

Page

Chapter 4. IFR

Section 6. HOLDING AIRCRAFT

4-50 Clearance to Holding Fix 4-15
4-51 Clearance Beyond Fix 4-16
4-52 Delays 4-16
4-53 Holding Instructions 4-16
4-54 Visual Holding Points 4-16
4-55 Holding Flight Path Deviation 4-16
4-56 Unmonitored NAVAIDS 4-17
4-57 ILS Protection/Critical Areas 4-17
4-58—4-59 Reserved 4-17

Section 7. ARRIVAL PROCEDURES

4-60 Clearance Information 4-18
4-61 Advance Descent Clearance 4-18
4-62 Single Frequency Approaches (SFA) 4-18
4-63 Radio Frequency and Radar Beacon Changes for Military Aircraft 4-18
4-64 Military Turbojet En Route Descent 4-19
4-65 Advance Approach Information 4-19
4-66 Arrival Information 4-19
4-67 Weather Information 4-20
4-68 Below Minima Report by Pilot 4-20
4-69 Transfer of Jurisdiction 4-20
4-70 Airport Conditions 4-20
4-71 Arrival Information by Approach Control Facilities 4-20
4-72 Approach Information by Approach Control Facilities 4-21
4-73 Switching ILS Runways 4-21
4-74—4-79 Reserved 4-22

Section 8. APPROACH CLEARANCE PROCEDURES

4-80 Approach Clearance 4-23
4-81 Clearance Limit 4-24
4-82 Relayed Approach Clearance 4-24
4-83 Altitude Assignment for Military High Altitude Instrument Approaches 4-24
4-84 Specifying Altitude 4-24
4-85 Circling Approach 4-24
4-86 Side-Step Maneuver 4-25
4-87 Communications Release 4-25
4-88 Missed Approach 4-25
4-89 Approach Information 4-25
4-90 Practice Approaches 4-25
4-91 Low Approach and Touch-and-Go 4-26

Chapter 4. IFR

Section 1. NAVAID USE LIMITATIONS

4-1 ALTITUDE AND DISTANCE LIMITATIONS

When specifying a route other than an established airway or route, do not exceed the limitations in the Table on any portion of the route which lies within controlled airspace.

4-1 Table. — Altitude and Distance Limitations

VOR/VORTAC/TACAN NAVAID'S

Normal Usable Altitudes and Radius Distances

Class	*Altitudes*	*Distance (miles)*
T	12,000 and below	25
L	Below 18,000	40
H	Below 18,000	40
H	14,500 — 17,999	*100
H	18,000 — FL 450	130
H	Above FL 450	100

*Applicable only within the conterminous 48 states.

L/MF Radio Beacon (RBN)

Usable Radius Distances for All Altitudes

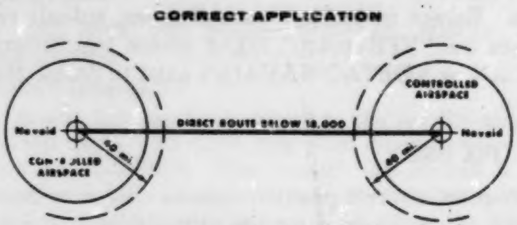
Class	*Power (watts)*	*Distance (miles)*
CL	Under 25	15
MH	Under 50	25
H	50 — 1,999	50
HH	2,000 or more	75

ILS

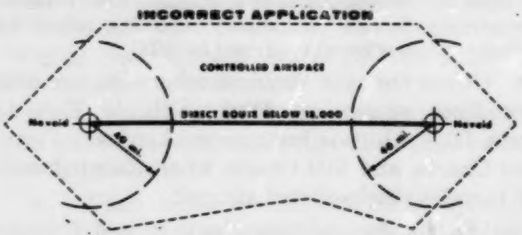
Usable Height and Distance*

Height above transmitter	*Distance (miles) from transmitter*
4,500	10 (for Glide Slope)
4,500	18 (for Localizer)

*Use current flight check height/altitude limitations if different from the above minima.


CORRECT APPLICATION
Navaid
40 mi.
CONTROLLED AIRSPACE
DIRECT ROUTE BELOW 18,000
CONTROLLED AIRSPACE
40 mi.
Navaid

4-1 Illustration 1


INCORRECT APPLICATION
CONTROLLED AIRSPACE
Navaid
40 mi.
DIRECT ROUTE BELOW 18,000
40 mi.
Navaid

4-1 Illustration 2

4-2 EXCEPTIONS

Altitude and distance limitations need not be applied when:

a. Routing is initiated by ATC and radar monitoring is provided.

b. Routing is requested by the pilot and radar flight following is provided for air traffic control purposes.

4-2b Note. — Paragraph 4-30i requires radar monitoring be provided at FL 450 and below to aircraft on random (impromptu) RNAV routes. Paragraph 5-70a requires radar separation be provided for these routes at FL450 and below.

c. Operational necessity requires and approval has been obtained from the Frequency Management and Flight Inspection Offices to exceed them.

d. Requested routing is via an MTR.

4-3 CROSSING ALTITUDE

Use an altitude consistent with the limitations of the aid when clearing an aircraft to cross or hold at a fix.

4-4 VFR-ON-TOP

Use a route not meeting service volume limitations only if an aircraft requests to operate "VFR-on-top" on this route.

4-4 Note. — Aircraft equipped with TACAN-only are expected to:

a. Define route of flight between TACAN or VORTAC NAVAID's in the same manner as VOR-equipped aircraft.

b. Except in positive control areas, submit requests for "VFR-on-top" flight where insufficient TACAN or VORTAC NAVAID's exist to define the route.

4-5 FIX USE

Request aircraft position reports only over fixes shown on charts used for the altitude being flown, except as follows:

4-5 Note. — Waypoints filed in random RNAV routes automatically become compulsory reporting points for the flight unless otherwise advised by ATC.

a. Unless the pilot requests otherwise, use only those fixes shown on High Altitude Enroute Charts, High Altitude Instrument Approach Procedures Charts, and SID Charts when clearing military turbojet single-piloted aircraft.

b. Except for military single-piloted turbojet aircraft, unpublished fixes may be used if the name of the NAVAID and, if appropriate, the radial/course and frequency are given to the pilot. An unpublished fix is defined as one approved and planned for publication which is not yet depicted on the charts or one which is used in accord with the following:

4-5b Reference. — Order 7130.3, Holding Pattern Criteria.

(1) Unpublished fixes are formed by the en route radial and either a DME distance from the same NAVAID or an intersecting radial from an off-route VOR/VORTAC/TACAN. DME shall be used in lieu of off-route radials, whenever possible.

(2) Except where known signal coverage restrictions exist, an unpublished fix may be used for ATC purposes if its location does not exceed NAVAID altitude and distance limitation, and when off-route radials are used, the angle of divergence meets the criteria prescribed below.

4-5b(2) Note. — Unpublished fixes should not negate the normal use of published intersections. Frequent routine use of an unpublished fix would justify establishing a fix.

4-5b(2) Reference. — Altitude and Distance Limitations, 4-1.

(3) Do not hold aircraft at unpublished fixes below the lowest assignable altitude dictated by terrain clearance for the appropriate holding pattern airspace area (template) regardless of the MEA for the route being flown.

(4) When the unpublished fix is located on an off-route radial and the radial providing course guidance, it shall be used consistent with the following divergence angles.

(a) When holding operations are involved, with respect to (b) and (c) below, the angle of divergence shall be at least 45 degrees.

(b) When both NAVAID's involved are located within 30 NM of the unpublished fix, the minimum divergence angle is 30 degrees.

(c) When the unpublished fix is located over 30 NM from the NAVAID generating the off-course radial, the minimum divergence angle shall increase 1 degree per nautical mile up to 45 NM; e.g., 45 NM would require 45 degrees.

(d) When the unpublished fix is located beyond 45 NM from the NAVAID generating the off-course radial, the minimum divergence angle shall increase ½ degree per nautical mile; e.g., 130 NM would require 88 degrees.

c. Fixes contained in the route description of MTR's are considered filed fixes.

4-6 thru 4-9 RESERVED

Section 2. CLEARANCES

4-10 CLEARANCE ITEMS

Issue the following clearance items, as appropriate, in the order listed below:

a. Aircraft identification.

b. Clearance limit.

c. Departure procedure or SID.

d. Route of flight including PDR/PDAR/PAR when applied.

e. Altitude data in the order flown.

f. *USAF:* When issuing a clearance to an airborne aircraft containing an altitude assignment, do not include more than one of the following in the same transmission:

(1) Frequency change.

(2) Transponder change.

(3) Heading.

(4) Altimeter setting.

(5) Traffic information containing an altitude.

g. Holding instructions.

h. Any special information.

i. Frequency and beacon code information.

4-11 CLEARANCE PREFIX

a. Prefix a clearance, information, or a request for information which will be relayed to an aircraft through a non-ATC facility by stating "A-T-C clears," "A-T-C advises," or "A-T-C requests."

b. Omit the term "ATC" when issuing a clearance, information, or a request for information to an ATC facility, including flight service stations, or to an aircraft by direct ATC communications.

c. Flight service stations shall prefix a clearance with the appropriate phrase: "ATC clears," "ATC advises," etc.

4-12 DELIVERY INSTRUCTIONS

Issue specific clearance delivery instructions, if appropriate.

4-13 CLEARANCE RELAY

Relay clearances verbatim.

4-14 ROUTE OR ALTITUDE AMENDMENTS

a. Amend route of flight in a previously issued clearance by one of the following:

(1) State which portion of the route is being amended and then state the amendment.

Phraseology:

CHANGE (portion of route) TO READ (amended route).

(2) State the amendment to the route and then state that the rest of the route is unchanged.

Phraseology:

(Amended route), REST OF ROUTE UNCHANGED.

(3) Issue the entire route by stating the amendment.

4-14a Examples. —

Cessna 21A has been cleared to the Airville airport via V41 Delta VOR V174 Alfa VOR, direct Airville airport, maintain 9000. After takeoff, the aircraft is rerouted via V41 Frank intersection, V71 Delta VOR, V174 Alfa VOR. The controller issues one of the following as an amended clearance:

"Cessna Two One Alfa change V41 Delta to read V41 Frank, V71 Delta."

"Cessna Two One Alfa cleared via V41 Frank, V71 Delta, rest of route unchanged."

"Cessna Two One Alfa cleared via V41 Frank, V71 Delta, V174 Alfa VOR, direct Airville airport, maintain niner thousand."

b. When route or altitude in a previously issued clearance is amended, restate all applicable altitude restrictions.

4-14b Example. —

A departing aircraft is cleared to cross Ollis intersection at or above 3,000; Gordonsville VOR at or above 12,000; maintain FL 200. Shortly after departure, the altitude to be maintained is changed to FL 240. Because altitude restrictions remain in effect, the controller issues amended clearance as follows:

"Cross Ollis intersection at or above three thousand; cross Gordonsville VOR at or above one two thousand; maintain flight level two four zero."

Shortly after departure, altitude restrictions are no longer applicable, the controller issues amended clearance as follows:

"Climb and maintain flight level two four zero."

4-14b Note. — Restating previously issued altitude to "maintain" is an amended clearance. If altitude to "maintain" is changed or restated, whether prior to departure or while airborne, and previously issued altitude restrictions are omitted, altitude restrictions are cancelled, including SID altitude restrictions, if any.

4-15 THROUGH CLEARANCES

You may clear an aircraft through intermediate stops.

Phraseology:

CLEARED THROUGH (airport) TO (fix).

4-16 ALTRV CLEARANCE

Use the phrase "via approved altitude reservation flight plan," if the aircraft will operate in an approved ALTRV.

Phraseology:

VIA APPROVED ALTITUDE RESERVATION (mission name) FLIGHT PLAN.

4-16 Note. — An ALTRV normally includes the departure, climb, cruise, and arrival phases of flight up to and including holding pattern or point/time at which ATC provides separation between aircraft.

4-17 IFR-VFR AND VFR-IFR FLIGHTS

a. Clear an aircraft planning IFR operations for the initial part of flight and VFR for the latter part to the fix at which the IFR part ends.

b. Treat an aircraft planning VFR for the initial part of flight and IFR for the latter part as a VFR departure. Issue a clearance to this aircraft when it requests IFR clearance approaching the fix where it proposes to start IFR operations. The phraseology CLEARED TO (destination) AIRPORT AS FILED may be used with abbreviated departure clearance procedures.

4-17b Reference. — Abbreviated Departure Clearance, 4-22.

4-18 thru 4-19 RESERVED

Section 3. DEPARTURE PROCEDURES

4-20 DEPARTURE TERMINOLOGY

Avoid using the term "takeoff" except to actually clear an aircraft for takeoff or to cancel a takeoff clearance. Use such terms as "depart," "departure," or "fly" in clearances when necessary.

4-21 DEPARTURE CLEARANCES

Include the following items in IFR departure clearances:

4-21 Note. — When considered necessary, controllers or pilots may initiate readbacks of a clearance. Some pilots may be required by company rule to do so.

a. Always include the airport of departure when issuing a departure clearance for relay to an aircraft by an FSS, dispatcher, etc.

b. Clearance Limit — Specify the destination airport when practicable, even though it is outside controlled airspace. Issue short range clearances as provided for in any procedures established for their use.

c. Departure Procedure — Specify direction of takeoff/turn or initial heading to be flown after takeoff as follows:

(1) Locations with Airport Traffic Control Service — Specify these items as necessary.

(2) Locations without Airport Traffic Control Service, but within a control zone — Specify these items if necessary. Obtain/solicit the pilot's concurrence concerning these items before issuing them in a clearance.

4-21c(2) Note. — Direction of takeoff and turn after takeoff can be obtained/solicited directly from the pilot, or relayed by an FSS, dispatcher, etc., as obtained/solicited from the pilot.

(3) At all other airports — Do not specify direction of takeoff/turn after takeoff. If necessary to specify an initial heading to be flown after takeoff, then issue the initial heading so as to apply only within controlled airspace.

d. When IFR departure procedures are published for a location and pilot compliance is necessary to insure separation, include the published departure procedure as part of the ATC clearance.

4-21d Note. — IFR takeoff minimums and departure procedures are prescribed for specific airports/runways and published in a tabular form supplement to the NOS Instrument Approach Procedure Charts and appropriate FAA Forms 8260. These procedures are identified on Approach Landing Charts with a symbol SYM.

e. Compatibility with a procedure issued may be verified by asking the pilot if items obtained/solicited will allow him to comply with local traffic pattern, terrain or obstruction avoidance.

Phraseology:

FLY RUNWAY HEADING.

DEPART (direction or runway).

TURN LEFT/RIGHT.

WHEN ENTERING CONTROLLED AIRSPACE (instruction), FLY HEADING (degrees) UNTIL REACHING (altitude, point or fix) BEFORE PROCEEDING ON COURSE.

FLY A (degree) BEARING FROM (fix) UNTIL (time),

or

UNTIL REACHING (fix or altitude)

and, if required

BEFORE PROCEEDING ON COURSE.

4-21e Examples. —

"Verify right turn after departure will allow compliance with local traffic pattern," or "Verify this clearance will allow compliance with terrain or obstruction avoidance."

4-21e Note. — If a published IFR departure procedure is not included in an ATC clearance, compliance with such a procedure is the pilot's prerogative.

f. SID routes:

(1) Assign a SID (including transition, if necessary). Assign a Preferential Departure Route (PDR) or the route filed by the pilot only when a SID is not established for the departure route to be flown or the pilot has indicated that he does not wish to use a SID.

Phraseology:

(SID name and number) DEPARTURE.

(SID name and number) DEPARTURE, (transition name) TRANSITION.

4-21f.(1) Examples. —

"Stroudsburg One Departure."

"Stroudsburg One Departure, Sparta Transition."

"Stroudsburg One RNAV Departure."

4-21f(1) Note. — If a pilot does not wish to use a SID issued in an ATC clearance or any other SID published for that location, he is expected to advise ATC.

(2) If it is necessary to assign a crossing altitude which differs from the SID altitude, repeat the changed altitude to the pilot for emphasis.

Phraseology:

(SID name) DEPARTURE, EXCEPT (revised altitude information). I SAY AGAIN (revised altitude information).

4-21f(2) Examples. —

"Stroudsburg One Departure, except cross Quaker at five thousand. I say again, cross Quaker at five thousand."

"Astoria Two RNAV Departure, except cross Astor waypoint at six thousand. I say again, cross Astor waypoint at six thousand."

(3) Specify altitudes when they are not included in the SID.

Phraseology:

(SID name) DEPARTURE. CROSS (fix) AT (altitude).

4-21f(3) Examples. —

"Stroudsburg One Departure. Cross Jersey intersection at four thousand. Cross Range intersection at six thousand."

"Engle Two RNAV Departure. Cross Pilim waypoint at or above five thousand. Cross Engle waypoint at or above seven thousand. Cross Gorge waypoint at niner thousand."

g. Route of flight — Specify one or more of the following:

(1) Airway, route, course, heading, arc, or vector.

(2) The routing a pilot can expect if any part of the route beyond a short range clearance limit differs from that filed.

Phraseology:

EXPECT FURTHER CLEARANCE VIA (airways, routes, or fixes.).

h. Altitude — Use one of the following, in the order of preference listed:

4-21h Note. — Turbojet aircraft equipped with afterburner engines may occasionally be expected to use afterburning during their climb to the en route altitude. When so advised by the pilot, the controller may be able to plan his traffic to accommodate the high performance climb and allow the pilot to climb to his planned altitude without restriction.

(1) Assign the altitude filed by the aircraft.

(2) Assign an altitude within the highest route stratum filed and as near as possible to the altitude filed by the aircraft. Interim altitude assignments shall not be used to satisfy this order of preference. They are covered in preference (3) below.

4-21h(2) Example. —

An aircraft has filed Flight Level 370. The nearest altitude within the filed route stratum that can be approved is Flight Level 330. The clearance will read: "Maintain flight level three three zero."

(3) Assign an interim altitude within the highest route stratum filed or as near as possible to the highest route stratum filed and inform the aircraft when to expect clearance to the assigned en route altitude consistent with (1) and (2) above. Comply with the provisions of (1) or (2) above before the aircraft reaches the fix or prior to the time specified in the clearance.

4-21h(3) Note. — In the event of a two-way radio communication failure before receiving the en route altitude assignment within the highest route stratum filed, the aircraft will begin climb to the expected altitude at the time or fix specified in the initial clearance. The altitude to be expected, included in the clearance, is not applicable once the aircraft has proceeded beyond the fix or the time designated in the clearance has expired.

Phraseology:

EXPECT (the filed altitude or an altitude within the filed stratum as near as possible to the filed altitude) AT (time or fix).

4-21h(3) Examples. —

An aircraft has filed Flight Level 350. Flight Level 230 is immediately available and Flight Level 350 will be available at the Appleton zero five zero radial 35 mile fix. The clearance will read: "Maintain flight level two three zero. Expect flight level three five zero at Appleton zero five zero radial three five mile fix."

An aircraft has filed 9,000 feet. An interim altitude restriction is required because of facility procedures/requirements. Assign the interim altitude and advise the aircraft at what time/point he may expect his filed or final altitude. The clearance will read: "Maintain five thousand. Expect niner thousand one zero minutes after departure."

4-22 ABBREVIATED DEPARTURE CLEARANCE

a. Issue an abbreviated departure clearance if its use reduces verbiage and the following conditions are met:

4-22a Reference. — IFR-VFR and VFR-IFR flights, 4-18b.

(1) The route of flight filed with ATC has not been changed by the pilot, company, operations officer, input operator, or in the stored flight plan program prior to departure.

4-22a(1) Note. — A pilot will not accept an abbreviated clearance if the route of flight filed with ATC has been changed by him or the company or the operations officer before departure. He is expected to inform the control facility on initial radio contact if he cannot accept the clearance. It is the responsibility of the company or operations officer to inform the pilot when they make a change.

(2) All ATC facilities concerned have sufficient route of flight information to exercise their control responsibilities.

4-22a.(2) Note. — The route of flight information to be provided may be covered in letters of agreement.

(3) When the flight will depart IFR, destination airport information is relayed between the facilities concerned prior to departure.

4-22a(3) Example 1. — A tower or flight service station relay of destination airport information to the center when requesting clearance. "Request clearance for United Four Sixty-one to O'Hare."

4-22a(3) Example 2. — A center relay to the tower or Flight Service Station when initiating a clearance, "Clearance for United Four Sixty-one to O'Hare."

4-22a(3) Note. — Pilots are expected to furnish the facility concerned with destination airport information on initial radio call-up. This will provide the information necessary for detecting any destination airport differences on facility relay.

(4) The assigned en route altitude is stated in the clearance.

b. If it is necessary to modify a filed route of flight, in order to achieve computer acceptance due, for example, to incorrect fix or airway identification, the contraction "FRC," meaning "Full Route Clearance Necessary," will be added to the remarks. The contraction "FRC" must always be the first item of intra-center remarks. When the contraction "FRC" appears on a flight progress strip, the controller issuing the ATC clearance to the aircraft shall issue a full route clearance.

4-22b Note. — Changes such as those made to conform with traffic flows and preferred routings are only permitted to be made by the pilot (or his operations office) or the controller responsible for initiating the clearance to the aircraft.

c. Specify the destination airport in the clearance.

d. When no changes are required in the filed route, state the phrase, "Cleared to (destination) airport: (SID and SID transition, as appropriate); then, as filed." If a SID is not assigned, follow with "As filed." Specify the en route altitude; and, if required, add any additional instructions or information.

Phraseology:

CLEARED TO (destination) AIRPORT;

and, as appropriate,

(SID name and number) DEPARTURE,

(transition name) TRANSITION; THEN,

AS FILED.

MAINTAIN (altitude);

and, if required,

(additional instructions or information).

If a SID is not assigned,

CLEARED TO (destination) AIRPORT AS FILED.

MAINTAIN (altitude);

and, if required,

(additional instructions or information).

4-22d Examples. —

"Cleared to Reynolds Airport; David Two RNAV Departure, Kingham Transition; then, as filed. Maintain niner thousand. Expect flight level four one zero, one zero minutes after departure."

"Cleared to Reynolds Airport as filed. Maintain niner thousand. Expect flight level four one zero, one zero minutes after departure."

4-22d Note 1. — SID's are excluded from "cleared as filed" procedures.

4-22d Note 2. — If a pilot does not wish to accept an ATC clearance to fly a SID, he is expected to advise ATC or state "No SID" in his flight plan remarks.

e. When a filed route will require revisions, the controller responsible for initiating the clearance to the aircraft shall either:

(1) Issue a full route clearance; or

(2) If it reduces verbage, state the phrase, "Cleared to (destination) airport, (SID and SID transition, as appropriate), then as filed, except . . .." Specify the necessary revision; then, the en route altitude; and, if required, add any additional instructions or information. If a SID is not assigned, state, "Cleared to (destination) airport as filed, except . . .." Specify the necessary revision, the en route altitude; and, if required, add any additional instructions or information.

Phraseology:

CLEARED TO (destination) AIRPORT;

and, as appropriate,

(SID name and number) DEPARTURE,

(transition name) TRANSITION; THEN,

AS FILED, EXCEPT CHANGE ROUTE

TO READ (amended route portion).

MAINTAIN (altitude);

and, if required,

(additional instructions or information).

If a SID is not assigned,

CLEARED TO (destination) AIRPORT AS FILED, EXCEPT CHANGE ROUTE TO READ (amended route portion).

MAINTAIN (altitude);

and, if required,

(additional instructions or information).

4-22e Examples. —

"Cleared to Reynolds Airport; South Boston One Departure; then, as filed, except change route to read, South Boston Victor Twenty Greensboro. Maintain eight thousand, report leaving four thousand."

"Cleared to Reynolds Airport as filed, except change route to read, South Boston Victor Twenty Greensboro. Maintain eight thousand, report leaving four thousand."

f. In a nonradar environment specify one, two, or more fixes, as necessary, to identify the initial route of flight.

4-22f Example. —

The filed route of flight is from Hutchins V10 Emporia, thence V10N and V77 to St. Joseph. The clearance will read:

"Cleared to Watson Airport as filed via Emporia, maintain seven thousand."

g. Do not apply these procedures when a pilot requests a detailed clearance or to military operations conducted within altitude reservations, stereo routes, operations above FL 600, and other military operations requiring special handling.

4-22g Note. — Departure clearance procedures and phraseology for military operations within approved altitude reservations, military operations above FL 600, and other military operations requiring special handling are contained in separate procedures in this handbook or in letters of agreement, as appropriate..

4-22g Reference. — ALTRV Clearances, 4-17; Military Operations Above FL 600, 8-30.

4-23 DEPARTURE RESTRICTIONS AND CLEARANCE VOID/RELEASE TIMES

a. Assign departure restrictions, clearance void times, or release times when necessary to separate departures from other traffic. The facility delivering a clearance to the aircraft, containing a clearance void or release time, shall issue a time check.

b. When issuing a "clearance void time" at airports not served by a control tower, provide alternate instructions to departing aircraft requiring the pilot to advise ATC of his intentions no later than 30 minutes after the clearance void time if not airborne.

Phraseology:

CLEARANCE VOID IF NOT OFF BY (clearance void time). IF NOT OFF BY (clearance void time), ADVISE (facility) NOT LATER THAN (time) OF INTENTIONS.

4-24 DELAY SEQUENCING

When aircraft elect to take delay on the ground before departure, issue departure clearances to them in the order in which the requests for clearance were originally made if practicable.

4-25 FORWARD DEPARTURE DELAY INFORMATION

Inform approach control facilities and/or towers of anticipated departure delays.

4-26 COORDINATION WITH RECEIVING FACILITY

a. Coordinate with the receiving facility before the departure of an aircraft if the departure point is less than 15 minutes flying time from the transferring facility's boundary unless an automatic transfer of data between automated systems will occur, in which case, the flying time requirement may be reduced to 5 minutes or replaced with a mileage from the boundary parameter when mutually agreeable to both facilities.

4-26a Note. — Agreements requiring additional time are encouraged between facilities that need earlier coordination. However, when agreements establish mandatory radar handoff procedures, coordination need only be effected in a timely manner prior to transfer of control.

4-26a Reference. — Radar Handoff Application, 5-60.

b. The actual departure time or a subsequent strip posting time shall be forwarded to the receiving facility unless assumed departure times are agreed upon and that time is within 3 minutes of the actual departure time.

4-27 VFR RELEASE OF IFR DEPARTURE

When an aircraft which has filed an IFR flight plan requests a VFR departure through a terminal facility, FSS, or air/ground communications station:

a. After obtaining, if necessary, approval from the facility/sector responsible for issuing the IFR clearance, you may authorize an IFR flight planned aircraft to depart VFR. Inform the pilot of the proper frequency and, if appropriate, where or when to contact the facility responsible for issuing the clearance.

b. If the facility/sector responsible or issuing the clearance is unable to issue a clearance, inform the pilot and suggest that the delay be taken on the ground. If the pilot insists upon taking off VFR and obtaining an IFR clearance in the air, inform the facility/sector holding the flight plan of the pilot's intentions and, if possible, the VFR departure time.

Phraseology:

VFR DEPARTURE AUTHORIZED. CONTACT (facility) ON (frequency) AT (location or time, if required) FOR CLEARANCE.

4-28 FORWARDING DEPARTURE TIMES

TERMINAL

Unless alternate procedures are prescribed in a letter of agreement or automatic departure messages are being transmitted between automated facilities, forward departure times to the facility from which you received the clearance and also the terminal departure controller when that position is involved in the departure sequence.

4-28 Note 1. — Letters of agreement prescribing assumed departure times or mandatory radar handoff procedures are alternatives for providing equivalent procedures.

4-28 Note 2. — The letters "DM" flashing in Field 4 of the Full Data Block signify unsuccessful transmission of an automatic departure message.

4-28 Reference. — Order 7210.3-1325, Automatic Acquisition/Termination Areas.

4-29 RESERVED

Section 4. ROUTE ASSIGNMENT

4-30 ROUTE USE

Clear aircraft via airways, route structures, random RNAV routes, and NAVAID's established for the altitude stratum in which the operation is to be conducted by one or more of the following:

4-30 Note. — Except for certain NAVAID's/routes used by scheduled air carriers or authorized for specific uses in the control of IFR aircraft, airways, routes, and NAVAID's established for use at specified altitudes are shown on U.S. Government charts or DOD FLIP charts.

4-30 Reference. — Minimum Enroute Altitudes, 4-44; Application of Vector, 5-90.

a. Designated airways and routes.

Phraseology:

VIA:

VICTOR (color) (airway number)(the word ROMEO when RNAV),

or

J (route number) (the word ROMEO when RNAV),

or

SUBSTITUTE (airway or jet route) FROM (fix) TO (fix),

or

IR (route number).

CROSS/JOIN VICTOR/(color) (airway number), (number of miles) MILES (direction) OF (fix).

b. Radials, courses, or direct to or from NAVAID's.

Phraseology:

DIRECT.

VIA:

(name of NAVAID) (specified) RADIAL/COURSE,

or

(fix) AND (fix),

or

RADIALS OF (airway or route) AND (airway or route).

c. DME arcs of VORTAC or TACAN aids.

d. Radials, courses, and headings of departure or arrival routes.

e. SID's/STAR's.

f. Vectors.

g. Fixes defined in terms of degree-distance from NAVAID's for special military operations.

h. Courses, bearings, quadrants, or radials within a radius of a NAVAID.

Phraseology:

CLEARED TO FLY (general direction from NAVAID) OF (NAVAID name and type) BETWEEN (specified) COURSES TO/BEARINGS FROM/RADIALS (NAVAID name when a NDB) WITHIN (number of miles) MILE RADIUS,

or

CLEARED TO FLY (specified) QUADRANT OF (NAVAID name and type) WITHIN (number of miles) MILE RADIUS.

4-30h Examples. —

"Cleared to fly east of Allentown VORTAC between the zero four five and the one three five radials within four zero mile radius."

"Cleared to fly east of Crystal Lake radio beacon between the two two five and the three one five courses to Crystal Lake within three zero mile radius."

"Cleared to fly northeast quadrant of Philipsburg VORTAC within four zero mile radius."

i. Fixes defined in terms of degree-distance from NAVAID's or offset from published or established routes/airways at a specified distance and direction for random (impromptu) RNAV Routes. Provide radar monitoring at FL 450 and below.

Phraseology:

DIRECT TO THE (facility)(radial)(distance)FIX.

OFFSET(distance) RIGHT/LEFT OF (route).

4-30i Examples. —

"Direct to the Appleton three one zero radial two five mile fix."

"Offset eight miles right of Victor Six."

4-30i Reference. — Radar Separation, 5-70.

4-31 ROUTE STRUCTURE TRANSITIONS

To effect transition within or between route structure, clear an aircraft by one or more of the following methods, based on VOR, VORTAC, or TACAN NAVAID's (unless use of other NAVAID's is essential to aircraft operation or ATC efficiency):

a. Vector aircraft to or from radials or courses of the airway or route assigned.

b. Assign a SID/STAR.

c. Clear departing or arriving aircraft to climb or descend via radials or courses of the airway or jet route assigned.

d. Clear departing or arriving aircraft directly to or between the NAVAID's forming the airway or route assigned.

e. Clear aircraft to climb or descend via the airway or route on which flight will be conducted.

f. Clear aircraft to climb or descend on specified radials or courses of NAVAID's.

g. Provide radar monitor when transition to or from a designated or established RNAV route is made along random RNAV routes.

h. Clear RNAV aircraft transitioning to or between designated or established RNAV routes direct to a named waypoint on the new route.

4-32 DEGREE-DISTANCE ROUTE DEFINITION USAF/USN

EN ROUTE

Do not accept a flight plan whose route or route segments do not coincide with designated airways or jet routes or with a direct course between NAVAID's unless the route or route segments are defined as follows:

4-32 Note. — The following military operations are authorized to define portions of their routing in accordance with degree-distance route definition:

a. Airborne radar navigation, radar bomb scoring (RBS), and airborne missile programming conducted by USAF, USN, and RAF.

b. Celestial navigation conducted by USAF, USN, and RAF.

c. Target aircraft operating in conjunction with ADC interceptors, and ADC interceptors while en route to and from assigned airspace.

d. Missions conducted above FL 450.

e. USN fighter and attack aircraft operating in positive control airspace.

f. USN/USMC aircraft, TACAN equipped, operating within the Honolulu FIR/Hawaiian airways area.

g. USAF/USN/USMC aircraft flight planned to operate on MTR's.

a. The portion of the route which cannot be defined by a designated airway or jet route or a course between NAVAID's is defined in the flight plan as a point composed of the following:

(1) A location identifier.

(2) Azimuth in degrees magnetic.

(3) Distance in miles from the NAVAID.

4-32a Example. —

"MKE 030025."

b. The NAVAID's selected are VOR/VORDME/VORTAC/TACAN NAVAID's authorized for use at the altitude being flown and the distance from the NAVAID does not exceed the distance criteria for the NAVAID being used.

4-32b Note. — Military aircraft using degree-distance procedures conduct operations in accordance with the following:

a. The departure and arrival phases are flight-planned to conform with the routine flow of traffic when operating within 75 miles of the departure and destination airport unless prior coordination has been effected with the appropriate air traffic control facility. Routings are defined via appropriate routes or airways, a direct course between NAVAID's, or as otherwise required to conform to the normal flow of traffic.

b. Flight plans are filed at least 2 hours before the estimated time of departure when any portion of the requested routing is defined in accordance with degree-distance procedures.

c. Airborne radar navigation and RBS aircraft conduct navigation to, from, or between special route definition fixes by the use of airborne radar, and in most cases airborne radar is used to provide navigation when the route is defined as direct over NAVAID's or over established route systems.

d. When ADC target force aircraft file flight plans to operate in the high altitude structure, they define degree-distance fixes based on high altitude en route NAVAID's depicted on high altitude charts, regardless of the type of NAVAID used to navigate to these fixes.

e. ADC target force aircraft maintain communications watch on 243.0 MHz and the appropriate ADC or ATC frequency while operating within an intercept area.

c. The distance between the fixes used to define the route does not exceed:

(1) Below FL 180 — 80 miles, except that for celestial navigation flights the distance in (2) shall apply between fixes used to define the celestial navigation portion of the route of flight.

(2) FL 180 and above — 260 miles.

d. Consider special route definition fixes as compulsory reporting points, except that an aircraft may be authorized to omit reports over these fixes when traffic conditions permit.

4-33 ALTERNATIVE ROUTES

When any part of an airway or route is unusable because of NAVAID status, clear aircraft via one of the following alternative routes:

a. A route depicted on current U.S. Government charts/publications. Use the word "substitute" immediately preceding the alternative route in issuing the clearance.

b. A route defined by specifying NAVAID radials or courses.

c. A route defined as direct to or between NAVAID's.

d. Vectors.

4-34 UNCONTROLLED AIRSPACE

Include routes through uncontrolled airspace only when requested by the pilot.

4-34 Note 1. — Flight plans filed for random RNAV routes through uncontrolled airspace are considered a request by the pilot.

4-34 Note 2. — Flight plans containing MTR segments in/through uncontrolled airspace are considered a request by the pilot/s.

4-35 thru 4-39 RESERVED

Section 5. ALTITUDE ASSIGNMENT AND VERIFICATION

4-40 FLIGHT DIRECTION

Clear aircraft at altitudes according to the Table.

4-40 Table. — Altitude Assignment

Aircraft Operating	*On course degrees magnetic*	*Assign*
Below 3,000 feet above surface	Any course	Any altitude
Below FL 290	0 through 179	Odd cardinal altitudes or flight levels at intervals of 2,000 feet
	180 through 359	Even cardinal altitudes or flight levels at intervals of 2,000 feet
At or above FL 290	0 through 179	Odd cardinal flight levels at intervals of 4,000 feet beginning with FL 290
	180 through 359	Odd cardinal flight levels at intervals of 4,000 feet beginning with FL 310
Within an ALTRV	Any course	Any altitude or flight level

4-40 Examples. —

3,000, 5,000, FL 250, FL 270.

4,000, 6,000, FL 240, FL 260.

FL 290, FL 330, FL 370.

FL 310, FL 350, FL 390.

4-41 EXCEPTIONS

When traffic, meteorological conditions, or aircraft operational limitations prevent assignment of altitudes prescribed in paragraph 4-40, assign any cardinal altitude or flight level below FL 290 or any odd cardinal flight level at or above FL 290 without regard to direction of flight as follows:

4-41 Note. — See 2-59 for control abbreviations and symbols to be used in conjunction with this paragraph.

a. For traffic conditions, take this action only if one of the following conditions exists:

(1) Aircraft remain within a facility's area and prior approval is obtained from other affected positions or sectors or the operations are covered in a Facility Directive.

(2) Aircraft will proceed beyond the facility's area and specific operations and procedures permitting random altitude assignment are covered in a letter of agreement between the appropriate facilities.

(3) Military aircraft are operating on random routes and prior approval is obtained from the facility concerned.

b. For meteorological conditions, take this action only if you obtain prior approval from other affected positions or sectors within your facility and, if necessary, from the adjacent facility concerned.

c. For aircraft operational limitations, take this action only if the pilot informs you the available appropriate altitude exceeds the operational limitations of his aircraft and only after you obtain prior approval from other affected positions or sectors within your facility and, if necessary, from the adjacent facility concerned.

d. For mission requirements, take this action only when the aircraft is operating on an MTR.

4-42 LOWEST USABLE FLIGHT LEVEL

If a change in atmospheric pressure affects a usable flight level in your area of jurisdiction, use the Table to determine the lowest usable flight level to clear aircraft at or above 18,000 feet msl.

4-42 Table. — Lowest Usable FL

Altimeter Setting	*Lowest Usable FL*
29.92" or higher	180
29.91" to 28.92"	190
28.91" to 27.92"	200

4-43 ADJUSTED MINIMUM FLIGHT LEVEL

When the prescribed minimum altitude for IFR operations is at or above 18,000 feet MSL, and the atmospheric pressure is less than 29.92", add the appropriate adjustment factor from the Table to the flight level equivalent of the minimum altitude in feet to determine the adjusted minimum flight level.

4-43 Table. — Minimum FL Adjustment

Altimeter Setting	*Adjustment Factor*
29.92" or higher	None
29.91" to 29.42"	500 feet
29.41" to 28.92"	1,000 feet

Altimeter Setting	*Adjustment Factor*
28.91" to 28.42"	1,500 feet
28.41" to 27.92"	2,000 feet

4-44 MINIMUM EN ROUTE ALTITUDES

Except as provided in a and b below, assign altitudes at or above the MEA for the route segment being flown. When a lower MEA for subsequent segments of the route is applicable, issue the lower MEA only after the aircraft is over or past the Fix/NAVAID beyond which the lower MEA applies unless a crossing restriction at or above the higher MEA is issued.

a. An aircraft may be cleared below the MEA but not below the MOCA for the route segment being flown if the altitude assigned is at least 300 feet above the floor of controlled airspace and one of the following conditions are met:

4-44a Note. — Controllers must be aware that in the event of radio communications failure, a pilot will climb to the MEA for the route segment being flown.

(1) Nonradar procedures are used only within 22 miles of a VOR, VORTAC, or TACAN.

(2) Radar procedures are used only when an operational advantage is realized and the following actions are taken:

(a) Radar navigational guidance is provided until the aircraft is within 22 miles of the NAVAID, and

(b) Lost communications instructions are issued.

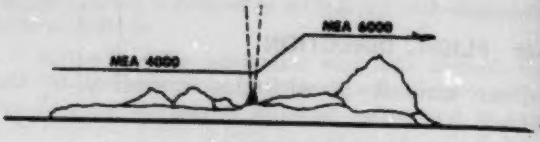
b. An aircraft may be cleared to operate on jet routes below the MEA (but not below the prescribed minimum altitude for IFR operations) or above the maximum authorized altitude if, in either case, radar service is provided.

4-44b Note. — Minimum en route and maximum authorized altitudes for certain jet route segments have been established above the floor of the jet route structure due to limitations on navigational signal coverage.

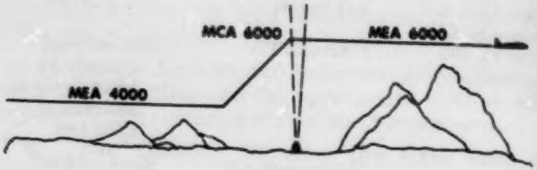
c. Where a higher altitude is required because of an MEA, the aircraft shall be cleared to begin climb to the higher MEA as follows:

(1) If no MCA is specified, prior to or immediately after passing the fix where the higher MEA is designated.

(2) If a MCA is specified, prior to the fix so as to cross the fix at or above the MCA.



4-44c Illustration 1



4-44c Illustration 2

d. Where MEA's have not been established, clear an aircraft at or above the minimum altitude for IFR operations prescribed by FAR 91.119.

4-45 ALTITUDE INFORMATION

When issuing altitude information, include the following items, as appropriate:

4-45 Reference. — Clearance Items, 4-10.

a. Altitude to maintain or cruise. When issuing cruise in conjunction with an airport clearance limit and an unpublished route will be used, issue an appropriate crossing altitude to ensure terrain clearance until the aircraft reaches a fix, point, or route where the altitude information is available to the pilot. When issuing a cruise clearance to an airport which does not have a published instrument approach, a cruise clearance without a crossing restriction may be issued.

Phraseology:

MAINTAIN/CRUISE (altitude). MAINTAIN (altitude) UNTIL (time), or PAST (fix), or (number of miles or minutes) MILES/MINUTES PAST (fix).

CROSS (fix, point) or INTERCEPT (route) AT OR ABOVE (altitude), CRUISE (altitude).

4-45a Note 1. — The crossing altitude must assure IFR obstruction clearance to the point where the aircraft is established on a segment of a published route or instrument approach procedure.

4-45a Note 2. — When an aircraft is issued a cruise clearance to an airport which does not have a published instrument approach procedure, it is not possible to satisfy the requirement for a crossing altitude that will ensure terrain clearance until the aircraft reaches a fix, point, or route where altitude information is available to the pilot. Under those conditions, a cruise clearance without a crossing restriction authorizes a pilot to determine the minimum IFR altitude as prescribed in FAR

91.119 and descend to it at pilot discretion if it is lower than the altitude specified in the cruise clearance.

b. Instructions to climb or descend, including restrictions, as required.

4-45b Reference. — Combining speed reduction with decent clearance, 5-101b.

Phraseology:

CLIMB/DESCEND AND MAINTAIN (altitude).

If required,

AFTER PASSING (fix),

or

AT (time).

CLIMB/DESCEND AND MAINTAIN (altitude) WHEN ESTABLISHED AT LEAST (number of miles or minutes) MILES/MINUTES PAST (fix) ON THE (NAVAID) (specified) RADIAL.

CLIMB/DESCEND TO REACH (altitude) AT (time or fix),

or

A POINT (number of miles) MILES (direction) OF (name of DME NAVAID).

c. Specified altitude over a specified fix.

Phraseology:

CROSS (fix) AT (altitude).

CROSS (fix) AT OR ABOVE/BELOW (altitude).

d. A specified altitude over a specified fix for that portion of a descent clearance where descent at pilot's discretion is permissible. At any other time it is practicable, authorize climb/descent at pilot's discretion.

Phraseology:

CLIMB/DESCEND AT PILOT'S DISCRETION.

4-45d Example 1. —

"United Four Seventeen, descend and maintain six thousand."

The pilot is expected to commence descent upon receipt of the clearance and to descend at the suggested rates specified in AIM, ATC Clearances/Separations, (Adherence to Clearance, Paragraph 270) until reaching the assigned altitude of 6,000 feet.

4-45d Example 2. —

"United Four Seventeen, descend at pilot's discretion, maintain six thousand."

The pilot is authorized to conduct descent within the context of the term "at pilot's discretion" as described in the AIM.

4-45d Example 3. —

"United Four Seventeen cross Lakeview V-O-R at or above flight level two zero zero, descend and maintain six thousand."

The pilot is authorized to conduct descent "at pilot's discretion", until reaching Lakeview VOR. He/she must comply with the clearance provision to cross the Lakeview VOR at or above FL 200, and after passing Lakeview VOR, he/she is expected to descend at the rates specified in the AIM until reaching the assigned altitude of 6,000 feet.

4-45d Example 4. —

"United Four Seventeen, cross Lakeview V-O-R at and maintain six thousand."

The pilot is authorized to conduct descent "at pilot's discretion," but must comply with the clearance provision to cross Lakeview VOR at 6,000 feet.

4-45d Example 5. —

"United Four Seventeen, descend now to flight level two seven zero, cross Lakeview V-O-R at or below one zero thousand, descend and maintain six thousand."

The pilot is expected to promptly execute and complete descent to FL 270 upon receipt of the clearance. After reaching FL 270, he/she is authorized to descend "at pilot's discretion" until reaching Lakeview VOR. He/she must comply with the clearance provision to cross Lakeview VOR at or below 10,000 feet. After Lakeview VOR, he/she is expected to descend at the rates specified in the AIM until reaching 6,000 feet.

4-45d Note. — A descent clearance which specifies a crossing altitude authorizes descent at pilot's discretion for that portion of the flight to which the crossing altitude restriction applies. Any other time that authorization to descend at pilot's discretion is intended it must be specifically stated by the controller.

4-45d Reference. — Glossary (Pilot's Discretion).

e. Altitude assignments involving more than one altitude.

Phraseology:

MAINTAIN (altitude) THROUGH (altitude).

4-46 ANTICIPATED ALTITUDE CHANGES

If practicable, inform an aircraft when to expect climb or descent clearance or to request altitude change from another facility.

Phraseology:

EXPECT CLIMB/DESCENT CLEARANCE IN (number of miles or minutes) MILES/MINUTES,

or

AT (fix). REQUEST ALTITUDE CHANGE FROM (name of facility).

If required,

AT (time, fix, or altitude).

4-47 ALTITUDE VERIFICATION — NON-AUTOMATIC ALTITUDE REPORTING

a. Request a pilot to verify altitude on initial contact and when position reports are received, unless:

(1) The pilot states his altitude at the time, or

(2) You assign a new altitude to a climbing or descending aircraft, or

(3) *TERMINAL:* The aircraft was intrafacility transferred to your control.

Phraseology:

In level flight situations

VERIFY AT (altitude).

In climbing/descending situations

VERIFY ASSIGNED ALTITUDE (altitude).

b. *USAF/USA:* Reconfirm all pilot altitude readbacks.

Phraseology:

If altitude readback is correct,

AFFIRMATIVE (altitude).

If altitude readback is not correct,

NEGATIVE. CLIMB/DESCEND AND MAINTAIN (Altitude),

or

NEGATIVE. MAINTAIN (altitude).

4-48 thru 4-49 RESERVED

Section 6. HOLDING AIRCRAFT

4-50 CLEARANCE TO HOLDING FIX

When it is necessary to clear an aircraft to a fix other than the destination airport, issue the following:

a. Clearance limit (if any part of the route beyond a clearance limit differs from the last routing cleared, issue the route the pilot can expect beyond the clearance limit).

Phraseology:

EXPECT FURTHER CLEARANCE VIA (routing).

4-50a Example. —

"Expect further clearance via direct Stillwater V-O-R, Victor Two Twenty-six Snapy Intersection, direct Newark,"

b. Holding instructions.

(1) Holding instructions may be eliminated when you inform the pilot that no delay is expected.

(2) When the pattern is charted, you may omit all holding instructions except the charted holding direction and the statement "as published." Always issue complete holding instructions when the pilot requests them.

4-50b(2) Note. — The most generally used holding patterns are depicted on U.S. Government or commercially produced low/high altitude en route, area, and STAR charts.

Phraseology:

CLEARED TO (fix), HOLD (direction), AS PUBLISHED,

or

CLEARED TO (fix), NO DELAY EXPECTED.

c. EFC. Do not specify this item if no delay is expected.

(1) When additional holding is expected at any other fix in your facility's area, state the fix and your best estimate of the additional delay. When more than one fix is involved, state the total additional en route delay (omit specific fixes).

4-50c(1) Note. — Additional delay information is not used to determine pilot action in the event of two-way communications failure. Pilots are expected to predicate their actions solely on the provisions of FAR 91.127.

Phraseology:

EXPECT FURTHER CLEARANCE (time).

and, if required,

ANTICIPATE ADDITIONAL (time in minutes/hours) MINUTE/HOUR DELAY AT (fix),

or

ANTICIPATE ADDITIONAL (time in minutes/hours) MINUTE/HOUR ENROUTE DELAY.

4-50c(1) Examples. —

"Expect further clearance one niner two zero, anticipate additional three zero minute delay at Sweet."

"Expect further clearance one five one zero, anticipate additional three zero minute en route delay."

(2) When additional holding is expected in an approach control area, state the total additional terminal delay.

Phraseology:

EXPECT FURTHER CLEARANCE (time),

and, if required,

ANTICIPATE ADDITIONAL (time in minutes/hours) MINUTE/HOUR TERMINAL DELAY.

(3) *TERMINAL:* When terminal delays exist or are expected, inform the appropriate center or approach control facility so that the information can be forwarded to arrival aircraft.

(4) When delay is expected, issue items 4-50a, b, and c at least 5 minutes before the aircraft is estimated to reach the clearance limit. If the traffic situation requires holding an aircraft that is less than 5 minutes from the holding fix, issue these items immediately.

4-50c(4) Note 1. — The AIM indicates that pilots should start speed reduction when 3 minutes or less from the holding fix. The additional 2 minutes contained in the 5-minute requirement are necessary to compensate for different pilot/controller ETAs at the holding fix, minor differences in clock times, and provision for sufficient planning and reaction times.

4-50c(4) Note 2. — When holding is necessary, the phrase "delay indefinite" should be used when an accurate estimate of the delay time and the reason for the delay cannot immediately be determined; i.e., disabled aircraft on the runway, terminal or center sector saturation, weather below landing minimums, etc. In any event, every attempt should be made to provide the pilot with the best possible estimate of his delay time and the reason for the delay. Controllers/supervisors should consult, as appropriate, with personnel (other sectors, weather forecasters, the airport management, other facilities, etc.) who can best provide this information.

Phraseology:

DELAY INDEFINITE, (reason, if known), EXPECT FURTHER CLEARANCE (time). (After determining the reason for the delay, advise the pilot as soon as possible.)

4-50 Examples. —

"Cleared to Drewe, hold west, as published, expect further clearance via direct Sidney V-O-R one three one five, anticipate additional two zero minute delay at Woody."

"Cleared to Aston, hold west on Victor Two Twenty-five, seven mile leg, left turns, expect further clearance one niner two zero, anticipate additional one five minute terminal delay."

"Cleared to Wayne, no delay expected."

"Cleared to Wally, hold north, as published, delay indefinite, snow removal in progress, expect further clearance one one three zero.

4-51 CLEARANCE BEYOND FIX

a. If no delay is expected, issue a clearance beyond the clearance limit as soon as possible and, whenever possible, at least 5 minutes before the aircraft reaches the fix.

b. Include the following items when issuing clearance beyond a clearance limit:

(1) Clearance limit or approach clearance.

(2) Route of flight. Specify one of the following:

(a) Complete details of the route (airway, route, course, fix(es), heading, arc, or vector).

(b) The phrase "via last routing cleared." Use this phrase only when the most recently issued routing to the new clearance limit is valid and verbiage will be reduced.

Phraseology:

VIA LAST ROUTING CLEARED.

(3) Assigned altitude if different from present altitude.

4-51 Note. — Except in the event of a two-way communications failure, when a clearance beyond a fix has not been received, pilots are expected to hold as depicted on U.S. Government or commercially produced (meeting FAA requirements) low/high altitude en route and area or STAR charts. If no holding pattern is charted and holding instructions have not been issued, pilots should ask ATC for holding instructions prior to reaching the fix. If a pilot is unable to obtain holding instructions prior to reaching the fix, he is expected to hold in a standard pattern on the course on which he approached the fix and request further clearance as soon as possible.

4-52 DELAYS

a. Advise your supervisor or flow controller as soon as possible when you delay or expect to delay aircraft.

b. When arrival delays reach or are anticipated to reach 30 minutes, take the following action:

(1) *EN ROUTE:* The center responsible for transferring control to an approach control facility or, for a nonapproach control destination, the center in whose area the aircraft will land shall issue total delay information as soon as possible after the aircraft enters the center's area. Whenever possible, the delay information shall be issued by the first center controller to communicate with the aircraft.

(2) *TERMINAL:* When tower en route control service is being provided, the approach control facility whose area contains the destination airport shall issue total delay information as soon as possible after the aircraft enters its approach control area. Whenever possible, the delay information shall be issued by the first terminal controller to communicate with the aircraft.

(3) Unless a pilot requests delay information, the actions specified in (1) and (2) above may be omitted when total delay information is available to pilots via ATIS.

Phraseology:

(Airport) ARRIVAL DELAYS (time in minutes/hours).

4-53 HOLDING INSTRUCTIONS

When necessary to issue holding instructions, specify:

a. Direction of holding from the fix.

b. Holding fix.

4-53b Note. — The holding fix may be omitted if included at the beginning of the transmission as the clearance limit.

c. Radial, course, bearing, airway, or route on which the aircraft is to hold.

d. Leg length in miles if DME or RNAV is to be used. Specify leg length in minutes if the pilot requests or you consider it necessary.

e. Direction of holding pattern turns only if left turns are to be made, the pilot requests, or you consider it necessary.

Phraseology:

HOLD (direction) OF (fix) ON (specified radial, course, bearing, airway, or route).

If leg length is specified,

(Number of minutes/miles) MINUTE/MILE LEG.

If direction of turn is specified,

LEFT/RIGHT TURNS.

4-54 VISUAL HOLDING POINTS

You may use as a holding fix a location which the pilot can determine by visual reference to the surface if he is familiar with it.

Phraseology:

HOLD AT (location) UNTIL (time or other condition).

4-54 Reference. — Visual Holding of VFR Aircraft, 7-4.

4-55 HOLDING FLIGHT PATH DEVIATION

Approve a pilot's request to deviate from the prescribed holding flight path if traffic conditions permit.

4-56 UNMONITORED NAVAIDS

Separate an aircraft holding at a fan marker or an unmonitored NAVAID from any other aircraft occupying the course which the holding aircraft will follow if it does not receive signals from the marker or NAVAID.

4-57 ILS PROTECTION/CRITICAL AREAS

When conditions are less than reported ceiling 800 feet and/or visibility 2 miles, do not authorize aircraft to hold below 5,000 feet inbound toward the airport on or within 1 statute mile of the localizer between the ILS FAF and the airport. *USAF:* Holding restriction applies only when an arriving aircraft is between the ILS FAF and the runway.

4-57a Reference. — Order 7130.3, paragraph 54 and Figure 20.

4-58 thru 4-59 RESERVED

Section 7. ARRIVAL PROCEDURES

4-60 CLEARANCE INFORMATION

Clear an arriving aircraft to a clearance limit by specifying the following:

a. Name of fix or airport.

b. Route of flight including a STAR and STAR Transition, if appropriate. Assign a STAR and STAR Transition to any civil aircraft in lieu of other routes; e.g., airways or Preferential Arrival Routes, when the routings are the same. The clearance shall include the name, the current number and the transition, if necessary, of the STAR to be flown. Assign a STAR to military aircraft only when a STAR is filed or requested by the pilot.

Phraseology:

(STAR name and number) ARRIVAL.

(STAR name and number) ARRIVAL, (transition name) TRANSITION.

4-60b Examples. —

"Rosewood One Arrival."

"Rosewood One Arrival, Delta Transition."

4-60b Note. — If a civil pilot does not wish to use a STAR issued in an ATC clearance or any other STAR published for that location, he is expected to advise ATC.

c. Assigned altitude if different from present altitude or when a STAR/STAR Transition is issued.

4-60c Example. —

Bayview Three RNAV Arrival, Helen Transition, maintain flight level three three zero."

d. Issue holding instructions, EFC, and additional delay information as required.

e. Instructions regarding further communications as appropriate.

4-60e Reference. — Radio Communications Transfer, 2-17.

4-61 ADVANCE DESCENT CLEARANCE

EN ROUTE

Take the following action when exercising control of aircraft landing at an airport located in an adjacent center's control area near the common boundary:

a. Coordinate with the receiving facility for a lower altitude and issue a clearance to the aircraft as appropriate.

b. Initiate this action at a distance sufficient from destination to allow for normal descent and speed reduction.

4-62 SINGLE FREQUENCY APPROACHES (SFA)

TERMINAL

Where SFA procedures for military single-piloted turbojet aircraft on an IFR flight plan are contained in a letter of agreement, do not require a radio frequency change after the aircraft begins approach, or after initial contact during an en route descent, until a landing or low approach has been completed, except under the following conditions:

4-62 Reference. — Order 7610.4-1566, Single Frequency Approach. Glossary (Single-piloted aircraft).

a. During daylight hours while the aircraft is in VFR conditions.

b. On pilot request.

c. When pilot cancels IFR flight plan.

d. In an emergency situation.

e. When aircraft is cleared for visual approach.

4-63 RADIO FREQUENCY AND RADAR BEACON CHANGES FOR MILITARY AIRCRAFT

When military single-piloted turbojet aircraft will conduct an approach wholly or partly in IFR conditions or at night, take the following action:

4-63 Note. — It is known that the mental distraction and the inadvertent movement of aircraft controls resulting from the pilot's turning, reaching, or leaning to change frequencies can induce spatial disorientation (vertigo).

a. Avoid radio frequency and radar beacon changes to the maximum extent that communications capabilities and traffic will permit. However, when changes are required:

(1) Give instructions early enough to allow the change before the aircraft reaches the approach fix or handoff point.

(2) Keep frequency/radar beacon changes to a minimum below 2,500 feet above the surface.

(3) Avoid requiring frequency/radar beacon changes during the time the aircraft is making a turn.

b. When traffic volume requires, a frequency other than the one used by aircraft making approaches may be assigned for use in transferring control to the approach control facility.

TERMINAL

c. If practicable, use a frequency common to both the GCA unit and approach control to minimize frequency changes.

d. When a GCA unit is not able to communicate on a common frequency, a change to a GCA frequency may be authorized.

e. When a nonradar approach will be made, aircraft may be instructed to change to tower frequency when:

(1) The reported ceiling is at or above 1,500 feet and visibility is 5 statute miles or more.

(2) The aircraft reports able to proceed by visual reference to the surface.

(3) The aircraft request and is cleared for a contact approach.

(4) The aircraft is cleared for a visual approach.

f. Avoid making frequency/radar beacon changes after an aircraft begins a high altitude approach.

g. In the event of a missed approach, do not require a frequency/radar beacon change before the aircraft reaches the missed approach altitude, MEA, or MVA.

4-64 MILITARY TURBOJET EN ROUTE DESCENT

Provide military turbojet aircraft the same arrival procedures that are provided for nonmilitary turbojet aircraft except:

4-64 Note. — It is the responsibility of the pilot to request a high altitude approach if he does not want normal arrival handling.

a. An en route descent may be used in a nonradar environment; however, radar capability should exist which will permit the aircraft to be vectored to the final approach course of a published high altitude instrument approach procedure or PAR/ASR approach. Do not use this procedure if other than normal vectoring delays are anticipated.

b. Prior to issuance of a descent clearance below the highest initial approach fix altitude established for any high altitude instrument approach procedure for the destination airport inform the aircraft:

(1) Type of approach to expect.

4-64b(1) Example. —

"Expect V-O-R approach to runway three two."

(2) Radar vectors will be provided to the final approach course.

4-64b(2) Example. —

"Expect surveillance/precision approach to Runway One Seven; radar vectors to final approach course."

(3) Current weather whenever the ceiling is below 1,000 feet *(USAF:* 1,500 feet) or the highest circling minimum whichever is greater, or when the visibility is less than 3 miles.

4-64b(3) Example. —

"Expect ILS approach to Runway Eight; radar vectors to localizer course. Weather (reported weather)."

c. If ATIS is provided and the pilot advises he has received the current ATIS broadcast before the descent clearance in b. is issued, omit those items in b. that are contained in the broadcast.

d. To avoid requiring an aircraft to fly at low altitudes for an excessive distance, descent clearance should be issued at a point determined by adding 10 to the first two digits of the flight level.

4-64d Example. —

For FL 370, 3710=47 miles.

4-64d Note. — Turbojet en route descents are based on a rate of descent of 4,000 to 6,000 feet per minute.

e. Do not terminate the en route descent of an aircraft without the consent of the pilot except as required by radar outage or an emergency situation.

4-65 ADVANCE APPROACH INFORMATION

When an aircraft intends to land at an airport where approach control services are provided and two or more instrument approach procedures are published, the facility controlling the aircraft immediately before entry into the approach control area shall inform the aircraft of the type of approach to expect or that it will be vectored to the airport. Omit this information if ATIS is provided for the airport or if visibility is 3 miles or better and the ceiling is at or above the highest initial approach altitude established for any low altitude instrument approach procedure for the airport.

Phraseology:

EXPECT (type) APPROACH.

EXPECT VISUAL APPROACH.

4-66 ARRIVAL INFORMATION

EN ROUTE

a. Forward the following information to nonapproach control towers soon enough to permit adjustment of the traffic flow or to FSS's soon enough to provide airport advisory service:

(1) Aircraft identification.

(2) Type of aircraft.

(3) ETA.

(4) Type of instrument approach procedure the aircraft will execute.

4-66a Note. — Specific time requirements are usually stated in a Letter of Agreement.

b. Forward the following information to approach control facilities before transfer of control jurisdiction:

4-66b Note. — Transfer points are usually specified in a Letter of Agreement.

(1) Aircraft identification.

(2) Type of aircraft and appropriate suffix, if transponder, DME or TACAN-only equipped.

(3) ETA or actual time, and proposed or actual altitude over clearance limit. The ETA need not be given if the arrival information is being forwarded during a radar handoff.

(4) Clearance limit (when other than the destination airport) and EFC issued to the aircraft. Clearance limit may be omitted when provided for in a letter of agreement.

(5) Time, fix, or altitude when control responsibility is transferred to the approach control facility. This information may be omitted when provided for in a letter of agreement.

Phraseology:

(Identification), (type of aircraft), ESTIMATED/OVER (clearance limit, (time), (altitude), EFC (time).

If required,

YOUR CONTROL,

or

YOUR CONTROL AT (time, fix or altitude).

4-67 WEATHER INFORMATION

EN ROUTE

When an available official weather report indicates weather conditions are below a 1,000-foot *(USAF:* 1,500-foot) ceiling or below the highest circling minimum, whichever is higher, or less than three-miles visibility for the airport concerned, transmit the weather report and changes classified as special weather observations to an arriving aircraft prior to or as part of the approach clearance when:

a. It is transmitted directly to the pilot via center controller-to-pilot communications.

b. It is relayed through a communications station other than an air carrier company radio or through a nonapproach control facility. You may do this by telling the station or non-approach control facility to issue current weather.

4-68 BELOW MINIMA REPORT BY PILOT

If an arriving aircraft reports weather conditions are below his landing minima:

4-68 Note. — Determination that existing weather/visibility is adequate for approach/landing is the responsibility of the pilot/aircraft operator.

a. Issue appropriate instructions to the aircraft to hold or proceed to another airport.

b. Adjust, as necessary, the position in the landing sequence of any other aircraft desiring to make approaches and issue approach clearances accordingly.

4-69 TRANSFER OF JURISDICTION

Transfer radio communications and control responsibility early enough to allow the receiving facility to clear an aircraft beyond the clearance limit before the aircraft reaches it.

4-70 AIRPORT CONDITIONS

a. *EN ROUTE:* Before issuing an approach clearance or en route descent, and subsequently as changes occur, inform an aircraft of any abnormal operation of approach and landing aids and of destination airport conditions that you know of which might restrict an approach or landing.

b. *TERMINAL:* On first contact or as soon as possible thereafter, and subsequently as changes occur, inform an aircraft of any abnormal operation of approach and landing aids and of destination airport conditions that you know of which might restrict an approach or landing. This information may be omitted if it is contained in the ATIS broadcast and the pilot states the appropriate ATIS code.

4-70b Reference. — Airport Conditions, Chapter 3, Section 3.

c. *TERMINAL:* Where RCR's are provided, transmit this information to USAF and ANG aircraft in accordance with one of the following. Issue the RCR to other aircraft upon pilot request.

(1) Before or when an approach clearance is issued.

(2) Before an en route descent clearance is issued.

(3) Prior to departure.

(4) As soon as possible after receipt of any subsequent changes in previously issued RCR information.

4-70c Note 1. — USAF has established RCR procedures for determining the average deceleration readings of runways under conditions of water, slush, ice, or snow. The use of RCR code is dependent upon the pilot having a "stopping capability chart" specifically applicable to his aircraft.

4-70c Note 2. — USAF offices furnish RCR information at airports serving USAF and ANG aircraft.

4-70c Reference. — Landing Area Conditions, 3-30.

4-71 ARRIVAL INFORMATION BY APPROACH CONTROL FACILITIES

TERMINAL

a. Forward the following information to nonapproach control towers soon enough to permit adjustment of the traffic flow or to FSSs soon enough to provide airport advisory service:

(1) Aircraft identification.

(2) Type of aircraft.

(3) ETA.

(4) Type of instrument approach procedure the aircraft will execute.

4-71a Note. — Specific time requirements are usually stated in a letter of agreement.

b. Forward the following information to the tower when the tower and TRACON are part of the same facility:

(1) Aircraft identification.

(2) Type aircraft, if required for separation purposes.

(3) Type of instrument approach procedure and/or runway, if differing from that in use.

4-71b Note. — The local controller has the responsibility to determine whether or not conditions are adequate for the use of ARTS data on the BRITE where a facility directive authorizes its use for the transfer of arrival data.

4-71b Reference. — Note 7210.3-1323, Use of ARTS Modify and Quick Look Functions.

c. Where the collocated or satellite tower has ARTS data displayed on its BRITE, the ARTS modify or quick look functions may be used to forward arrival data provided that a Facility Directive at the collocated tower, or a letter of agreement with the satellite tower, exists which outlines procedures for using ARTS for transferring this data.

d. Forward the following information to centers:

(1) Where two or more instrument approach procedures are published for the airport, the particular procedure which an aircraft can expect or that it will be vectored toward the airport for a visual approach.

(2) Highest altitude being used by the approach control facility at the holding fix.

(3) Average time interval between successive approaches.

(4) Arrival time of aircraft over the holding fix or, if control has been transferred to you before an aircraft has reached the fix, a statement or other indication acknowledging receipt of control responsibility.

(5) Revised EFC if different by 10 minutes or more from that issued by the center.

(6) Missed approaches if they affect center operations.

(7) Information relating to an unreported or overdue aircraft.

4-72 APPROACH INFORMATION BY APPROACH CONTROL FACILITIES

TERMINAL

a. Provide current approach information to arriving aircraft on first radio contact or as soon as possible thereafter. Approach information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS code; otherwise, issue approach information by including the following:

(1) Approach clearance or type approach to be expected if two or more approaches are published and the clearance limit does not indicate which will be used.

4-72a(1) Reference. — Advance Approach Information, 4-65

(2) Runway, if different from that to which the instrument approach is made.

(3) Surface wind.

(4) Ceiling and visibility if the ceiling at the airport of intended landing is reported below 1,000 feet *(USAF:* 1,500 feet) or below the highest circling minimum, whichever is greater, or the visibility is less than 3 miles.

(5) Altimeter setting for the airport of intended landing.

4-72a(5) Reference. — Altimeter Settings, Chapter 2, Section 7.

b. Issue any known changes classified as special weather observations as soon as possible. Special weather observations need not be issued after they are included in the ATIS broadcast and the pilot states the appropriate ATIS code.

c. Advise pilots when the ILS on the runway in use is not operational if that ILS is on the same frequency as an operational ILS serving another runway.

4-72c Example. —

"Expect Visual Approach Runway Two Five Right, Runway Two Five Right I-L-S not operational."

4-72c Reference. — FAR 91.87(d)(2).

4-73 SWITCHING ILS RUNWAYS

TERMINAL, USAF NOT APPLICABLE

When a change is made from one instrument landing system (ILS) to another at airports equipped with multiple systems which are not used simultaneously, do the following:

a. Coordinate with facilities which use fixes formed by reference to these ILS courses.

b. Broadcast on an appropriate frequency that a change is to be made.

Phraseology:

ATTENTION, I-L-S RUNWAY (runway number) WILL BE CHANGED TO I-L-S RUNWAY (runway number) ON (frequency) AT (time).

c. After the change is made, broadcast that it has been done.

Phraseology:

ATTENTION, I-L-S RUNWAY (runway number) ON (frequency) NOW IN OPERATION.

4-74 thru 4-79 RESERVED

Section 8. APPROACH CLEARANCE PROCEDURES

4-80 APPROACH CLEARANCE

a. Clear aircraft for "standard" or "special" instrument approach procedures only. To require an aircraft to execute a particular instrument approach procedure, specify in the approach clearance the name of the approach as published on the approach chart. Where more than one procedure is published on a single chart, and a specific procedure is to be flown, amend the approach clearance to specify execution of the specific approach to be flown. If only one instrument approach of a particular type is published, the approach need not be identified by the runway reference. An aircraft conducting an ILS approach when the glideslope is reported out of service shall be advised at the time an approach clearance is issued. Where adequate radar coverage exists, radar facilities may vector aircraft to the final approach course in accordance with paragraph 5-120.

Phraseology:

CLEARED FOR (type) APPROACH.

For a straight-in-approach — IFR

CLEARED FOR STRAIGHT-IN (type) APPROACH.

To authorize a pilot to execute his choice of instrument approach

CLEARED FOR APPROACH.

Where more than one procedure is published on a single chart and a specific procedure is to be flown,

CLEARED FOR (specific procedure to be flown) APPROACH.

To authorize a pilot to execute an ILS approach when the glideslope is out of service

CLEARED FOR (type) APPROACH, GLIDESLOPE UNUSABLE.

4-80a Examples. —

"Cleared for V-O-R Approach."

"Cleared for V-O-R Runway Three Six Approach."

"Cleared for I-L-S Approach."

"Cleared for Localizer Back Course Runway One Three Approach."

"Cleared for RNAV Runway Two Two Approach."

"Cleared for Branch One RNAV Arrival and RNAV Runway One Three Approach."

"Cleared for I-L-S Runway Three Six Approach, glideslope unusable."

4-80a Note 1. — Clearances authorizing instrument approaches are issued on the basis that, if visual contact with the ground is made before the approach is completed, the entire approach procedure will be followed unless the pilot receives approval for a contact approach, is cleared for a visual approach, or cancels his IFR flight plan.

4-80a Note 2. — Approach clearances are issued based on known traffic. The receipt of an approach clearance does not relieve the pilot of his responsibility to comply with applicable FARs and the notations on instrument approach charts which levy on the pilot the responsibility to comply with or act on an instruction; e.g., "Straight-in minima not authorized at night," "Procedure not authorized when glide slope not used," "Use of procedure limited to aircraft authorized to use airport," or "Procedure not authorized at night."

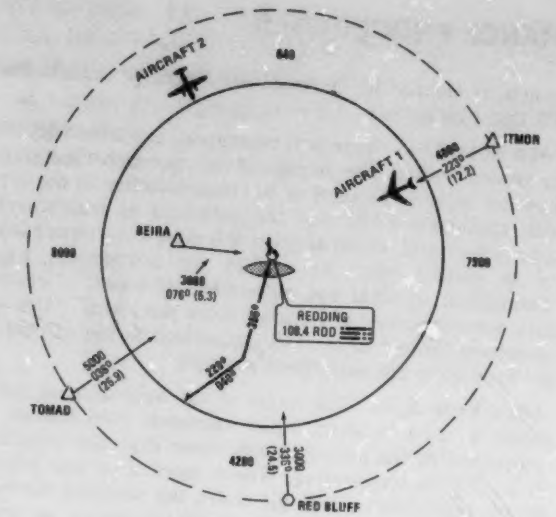
4-80a Note 3. — The name of the approach, as published, is used to identify the approach even though a component of the approach aid, other than the localizer on an ILS, is inoperative. Where more than one procedure is published on a single chart, the depicted runway or alphabetical suffixes apply to all procedures on that chart. For example, the Instrument Approach Procedures published on a chart as "Hi-VOR/DME or TACAN or ILS RWY 6L" would be stated as either Hi-VOR/DME Rwy 6L approach, or Hi-TACAN Rwy 6L approach, or Hi-ILS Rwy 6L approach.

4-80a Note 4. — FAR 91.116 requires a pilot to receive a clearance for a procedure turn when vectored to a final approach fix or position, conducting a timed approach, or when the procedure specifies "No PT."

4-80a Note 5. — An aircraft which has been cleared to a holding fix and prior to reaching that fix is issued a clearance for an approach, but not issued a revised routing; i.e., "proceed direct to. . . ." may be expected to proceed via the last assigned route, a transition if one exists, and then to the initial approach fix to commence the approach as depicted on the approach chart. If, by following the route of flight to the holding fix, the aircraft would overfly a transition fix or an initial approach fix to be used, the aircraft may be expected to proceed with the approach via the transition or initial approach fix, as appropriate; i.e., the aircraft would not be expected to overfly and return to those fixes.

b. For aircraft operating on unpublished routes, issue the approach clearance only after the aircraft is:

(1) Established on a segment of a published route or instrument approach procedure, or



4-80b Illustration

4-80b(1) Example. —

Aircraft 1: The aircraft is established on a segment of a published route at 5,000 feet. "Cleared for V-O-R Runway Three Four Approach."

(2) Assigned an altitude to maintain until the aircraft is established on a segment of a published route or instrument approach procedure.

4-80b(2) Example. —

Aircraft 2: The aircraft is inbound to the VOR on an unpublished direct route at 7,000 feet. The minimum IFR altitude for IFR operations (FAR 91.119) along this flight path to the VOR is 5,000 feet. "Cross the Redding V-O-R at or above five thousand, cleared for V-O-R Runway Three Four Approach."

4-80b(2) Note 1. — The altitude assigned must assure IFR obstruction clearance from the point at which the approach clearance is issued until established on a segment of a published route or instrument approach procedure.

4-80b(2) Note 2. — If the altitude assignment is VFR-on-top, it is conceivable that the pilot may elect to remain high until arrival over the final approach fix which may require the pilot to circle to descend so as to cross the final approach fix at an altitude that would permit landing.

c. Except when applying radar procedures, timed, or visual approaches, clear an aircraft for an approach to an airport when:

(1) The preceding aircraft has landed or cancelled IFR flight plan, or

(2) The preceding aircraft is visible to the tower controller and sufficiently cost to the airport that landing is imminent.

4-80c(2) Note. — This procedure should not be applied to circling approaches unless procedures exist that assure separation during the circling maneuver and in the event of an unanticipated missed approach of either aircraft.

4-80c(2) Reference. — Nonradar Separation, Chapter 6.

4-81 CLEARANCE LIMIT

Issue approach or other clearances as required, specifying the destination airport as the clearance limit if airport traffic control service is not provided, even though this is a repetition of the initial clearance.

4-82 RELAYED APPROACH CLEARANCE

TERMINAL

When an approach clearance is relayed through a communication station other than an air carrier company radio, include the weather report, if required. You may do this by telling the station to issue current weather.

4-83 ALTITUDE ASSIGNMENT FOR MILITARY HIGH ALTITUDE INSTRUMENT APPROACHES

Altitudes above those shown on the High Altitude Instrument Approach Procedures chart may be specified when required for separation.

4-83 Note. — To preclude the possibility of aircraft exceeding rate-of-descent or airspeed limitations, the maximum altitudes which may be assigned for any portion of the high altitude instrument approach procedure will be determined through coordination between the ATC facility concerned and the military authority which originated the high altitude instrument approach procedure.

4-83 Reference. — Military Turbojet Enroute Descent, 4-64.

4-84 SPECIFYING ALTITUDE

Specify in the approach clearance the altitude shown in the approach procedures when adherence to that altitude is required for separation. When vertical separation will be provided from other aircraft by pilot adherence to the prescribed maximum, minimum, or mandatory altitudes, the controller may omit specifying the altitude in the approach clearance.

4-84 Note. — Use NOS or DMAAC instrument approach procedures charts appropriate for the aircraft executing the approach.

4-85 CIRCLING APPROACH

TERMINAL

a. Include in the approach clearance instructions to circle to the runway in use if landing will be made on a runway other than that aligned with the direction of instrument approach. When the direction of the circling maneuver in relation to the airport/runway is required, state the direction (eight cardinal compass points) and specify a left or right base/downwind leg as appropriate.

Phraseology:

CIRCLE TO RUNWAY (runway number),

or

CIRCLE (direction using eight cardinal compass points) OF THE AIRPORT/RUNWAY FOR A LEFT/RIGHT BASE/DOWNWIND TO RUNWAY (runway nunber).

4-85a Note. — Where Standard Instrument Approach Procedures authorize circling approaches, they provide a basic minimum of 300 feet of obstacle clearance at MDA within the circling area considered. The dimensions of these areas, expressed in distances from the runways, vary for the different approach categories of aircraft. In some cases a SIAP may otherwise restrict circling approach maneuvers.

4-85a Reference. — Order 7210.3-215, Circling Approach Areas.

b. Do not issue clearances, such as "extend downwind leg," which might cause an aircraft to exceed the circling approach area distance from the runways within which required circling approach obstacle clearance is assured.

4-86 SIDE-STEP MANEUVER

TERMINAL

Side-Step Maneuver — When authorized by an instrument approach procedure, you may clear an aircraft for an approach to one runway and inform the aircraft that landing will be made on a parallel runway.

4-86 Example. —

"Cleared for I-L-S Runway Seven Left Approach. Side-step to Runway Seven Right."

4-86 Note. — Side-step maneuvers require higher weather minima/MDA. These higher minima/MDA are published on the instrument approach charts.

4-86 Reference. — Glossary (Side-Step Maneuver).

4-87 COMMUNICATIONS RELEASE

If an IFR aircraft intends to land at an airport not served by a tower or FSS, approve a change to the advisory service frequency when you no longer require direct communications.

Phraseology:

CHANGE TO ADVISORY FREQUENCY APPROVED.

4-87 Note. — Expeditious frequency change permits the aircraft to receive timely local airport traffic information in accordance with AC 90-42B.

4-88 MISSED APPROACH

Except in the case of a VFR aircraft practicing an instrument approach, an approach clearance automatically authorizes the aircraft to execute the missed approach procedure depicted for the instrument approach being flown. An alternate missed approach procedure as published on the appropriate FAA Form 8260 may be assigned when necessary. Once an aircraft commences a missed approach, it may be radar vectored.

4-88 Note 1. — Alternate missed approach procedures are published on the appropriate FAA Form 8260 only and require a detailed clearance when they are issued to the pilot.

4-88 Note 2. — In the event of a missed approach involving a turn, unless otherwise cleared, the pilot will proceed to the missed approach point before starting that turn

4-89 APPROACH INFORMATION

Specify the following in the approach clearance when the pilot says he is unfamiliar with the procedure:

a. Initial approach altitude.

b. Direction and distance from the holding fix within which procedure turn is to be completed.

c. Altitude at which the procedure turn is to be made.

d. Final approach course and altitude.

e. Missed approach procedures, if considered necessary.

Phraseology:

INITIAL APPROACH AT (altitude), PROCEDURE TURN AT (altitude) (number) MINUTES/MILES (direction), FINAL APPROACH ON (name of NAVAID) (specified) COURSE/RADIAL AT (altitude).

4-90 PRACTICE APPROACHES

Except for military aircraft operating at military airfields, ensure that neither VFR nor IFR practice approaches disrupt the flow of other arriving and departing IFR or VFR aircraft. Authorize, withdraw authorization, or refuse to authorize practice approaches as traffic conditions require. Normally, approaches in progress should not be terminated.

4-90 Note. — The priority afforded other aircraft over practice instrument approaches is not intended to be so rigidly applied that it causes grossly inefficient application of services.

a. Separation.

(1) IFR aircraft practicing instrument approaches shall be afforded standard separation in accordance with Chapters 3, 4, 5, and 6 minima until:

(a) The aircraft lands and the flight is terminated, or

(b) The pilot cancels the flight plan.

(2) Where procedures require application of IFR separation to VFR aircraft practicing instrument approaches, standard separation in accordance with Chapters 3, 4, 5, and 6 shall be provided. Controller responsibility for separation of VFR aircraft begins at the point where the approach clearance becomes effective, or when the aircraft enters TRSA/TCA airspace, whichever comes first. Except for heavy aircraft, 500 feet vertical separation may be applied between VFR aircraft and between a VFR and an IFR aircraft.

4-90a(2) References. — Order 7210.3-833 and 1234

(3) Where separation services are not provided to VFR aircraft practicing instrument approaches, the controller shall;

(a) Instruct the pilot to maintain VFR.

(b) Advise the pilot that separation services are not provided.

(c) Provide traffic information or advise the pilot to contact the appropriate facility.

(4) If an altitude is assigned, including at-or-above/below altitudes, the altitude specified must meet MVA, minimum safe altitude, or minimum IFR altitude criteria.

4-90a(4) Reference. — Altitude Assignments, 7-94.

(5) All VFR aircraft shall be instructed to maintain VFR on initial contact or as soon as possible thereafter.

4-90a(5) Note. — This advisory is intended to remind the pilot that even though ATC is providing IFR-type instructions, the pilot is responsible for compliance with the applicable FARs governing VFR flight.

b. Missed Approaches.

(1) Unless alternate instructions have been issued, IFR aircraft are automatically authorized to execute the missed approach depicted for the instrument approach being flown.

4-90b(1) Reference. — Missed Approach, 4-88.

(2) VFR aircraft are not automatically authorized to execute the missed approach procedure. This authorization must be specifically requested by the pilot and approved by the controller. When a missed approach has been approved, separation shall be provided throughout the missed approach.

4-91 LOW APPROACH AND TOUCH-AND-GO

TERMINAL

Before an aircraft which plans to execute a low approach or touch-and-go begins final descent, issue appropriate departure instructions to be followed upon completion of the approach. Climb-out instructions must include a specific heading and altitude except when the aircraft will maintain VFR and contact the tower.

Phraseology:

AFTER COMPLETING LOW APPROACH/ TOUCH-AND-GO:

CLIMB AND MAINTAIN (altitude).

TURN (right or left) HEADING (degrees)/FLY RUNWAY HEADING,

or

MAINTAIN VFR, CONTACT TOWER,

or

(other instructions as appropriate).

4-91 Note. — This may be omitted after the first approach if instructions remain the same.

4-91 Reference. — Overhead Approach, 3-133.

TABLE OF CONTENTS

Page

Chapter 5. RADAR

Section 1. GENERAL

5-1 Presentation and Equipment Performance 5-1
5-2 Alignment Check 5-1
5-3 Radar Use 5-1
5-4 Beacon Range Accuracy 5-1
5-5 ECM/ECCM Activity 5-2
5-6 Service Limitations 5-2
5-7 Electronic Cursor 5-2
5-8 Merging Target Procedures 5-3
5-9 Holding Pattern Surveillance 5-3
5-10 Deviation Advisories 5-3
5-11 Radar Fix Posting 5-3
5-12 Position Reporting 5-3
5-13 Radar Service Termination 5-3
5-14—5-19 Reserved 5-3

Section 2. BEACON SYSTEMS

5-20 Assignment Criteria 5-4
5-21 Discrete Environment 5-4
5-22 Nondiscrete Environment 5-4
5-23 Mixed Environment 5-4
5-24 Radar Beacon Code Changes 5-4
5-25 Function Code Assignments 5-4
5-26 Reverting to Broadband 5-5
5-27 Emergency Code Assignment 5-5
5-28 Radio Failure 5-6
5-29 VFR Code Assignments 5-6
5-30 Beacon Code for Pressure Suit Flights and Flights Above FL 600 5-6
5-31 Air Defense Exercise Beacon Code Assignment 5-6
5-32 Standby or Low Sensitivity Operation 5-7
5-33 Code Monitor 5-7
5-34 Failure to Display Assigned Beacon Code or Inoperative/Malfunctioning Transponder 5-8
5-35 Inoperative or Malfunctioning Interrogator 5-8
5-36 Failed Transponder in Positive Control Area 5-8
5-37 Verification of Automatic Altitude Readout 5-8
5-38 Automatic Altitude Reporting 5-9
5-39 In-Flight Deviations from Transponder/Mode C Requirements Between 12,500 Feet and 18,000 Feet .. 5-9
5-40 Beacon Termination 5-9
5-41—5-49 Reserved 5-9

Section 3. RADAR IDENTIFICATION

5-50 Application 5-10
5-51 Primary Radar Identification Methods 5-10
5-52 Beacon Identification Methods 5-10
5-53 ARTS/PIDP Identification Methods 5-11
5-54 Questionable Identification 5-11
5-55 Position Information 5-11
5-56 Identification Status 5-11
5-57 Target Markers 5-11
5-58—5-59 Reserved 5-11

TABLE OF CONTENTS—Continued

Page

Chapter 5. RADAR

Section 4. TRANSFER OF RADAR IDENTIFICATION

5-60 Application 5-12
5-61 Terms 5-12
5-62 Methods 5-12
5-63 Traffic 5-12
5-64 Transferring Controller Handoff 5-12
5-65 Receiving Controller Handoff 5-13
5-66 Point Out 5-14
5-67—5-69 Reserved 5-14

Section 5. RADAR SEPARATION

5-70 Application 5-15
5-71 Target Separation 5-15
5-72 Minima 5-15
5-73 Passing or Diverging 5-16
5-74 Additional Separation for Formation Flights 5-16
5-75 Separation From Obstructions 5-16
5-76 Adjacent Airspace 5-17
5-77 Edge of Scope 5-17
5-78 Beacon Target Displacement 5-17
5-79 GPA 102/103 Correction Factor 5-17
5-80—5-89 Reserved 5-17

Section 6. VECTORING

5-90 Application 5-18
5-91 Methods 5-18
5-92—5-99 Reserved 5-19

Section 7. SPEED ADJUSTMENT

5-100 Application 5-20
5-101 Methods 5-20
5-102 Minima 5-21
5-103 Limitations 5-21
5-104 Termination 5-21
5-105—5-109 Reserved 5-21

Section 8. RADAR DEPARTURES

5-110 Procedures 5-22
5-111 Initial Heading 5-22
5-112 Vectors Below Minimum Altitude 5-22
5-113 Successive or Simultaneous Departures 5-22
5-114 Departure and Arrival 5-23
5-115 Departures and Arrivals on Parallel or Nonintersecting Diverging Runways 5-23
5-116—5-119 Reserved 5-24

Section 9. RADAR ARRIVALS

5-120 Vectors to Final Approach Course 5-25
5-121 Final Approach Course Interception 5-25
5-122 Vectors Across Final Approach Course 5-25
5-123 Arrival Instructions 5-25
5-124 Approach Separation Responsibility 5-26
5-125 Parallel ILS Approach 5-27
5-126 Simultaneous ILS Approaches 5-27

TABLE OF CONTENTS—Continued

Page

Chapter 5. RADAR

5-127—5-129 Reserved 5-28

Section 10. RADAR APPROACHES — TERMINAL

5-130 Application 5-29
5-131 Approach Information 5-29
5-132 No-Gyro Approach 5-29
5-133 Lost Communications 5-30
5-134 Radar Contact Lost 5-30
5-135 Landing Check 5-30
5-136 Position Information 5-30
5-137 Final Controller Changeover 5-31
5-138 Communications Check 5-31
5-139 Transmission Acknowledgment 5-31
5-140 Wheels Down Check 5-31
5-141 Missed Approach 5-31
5-142 Low Approach and Touch-and-Go 5-31
5-143 Tower Clearance 5-31
5-144 Final Approach Abnormalities 5-31
5-145—5-149 Reserved 5-32

Section 11. SURVEILLANCE APPROACHES — TERMINAL

5-150 Altitude Information 5-33
5-151 Visual Reference Report 5-33
5-152 Descent Notification 5-33
5-153 Descent Instructions 5-33
5-154 Final Approach Guidance 5-33
5-155 Approach Guidance Termination 5-34
5-156—5-159 Reserved 5-34

Section 12. PAR APPROACHES — TERMINAL

5-160 Glidepath Notification 5-35
5-161 Decision Height (DH) Notification 5-35
5-162 Descent Instruction 5-35
5-163 Glidepath and Course Information 5-35
5-164 Distance from Touchdown 5-35
5-165 Decision Height 5-35
5-166 Position Advisories 5-35
5-167 Communication Transfer 5-35
5-168 Elevation Failure 5-35
5-169 Surveillance Unusable 5-36
5-170—5-179 Reserved 5-36

Section 13. USE OF PAR FOR APPROACH MONITORING — TERMINAL

5-180 Monitor on PAR Equipment 5-37
5-181 Monitor Availability 5-37
5-182 Monitor Information 5-37
5-183 Wheels Down Check 5-37
5-184—5-189 Reserved 5-38

Section 14. AUTOMATION — EN ROUTE

5-190 Conflict Alert 5-39
5-191 En Route Minimum Safe Altitude Warning (E-MSAW) 5-39
5-192 Computer Entry of Assigned Altitude 5-39
5-193 Entry of Reported Altitude 5-39

TABLE OF CONTENTS—Continued

Page

Chapter 5. RADAR

5-194 Selected Altitude Limits 5-40
5-195 Sector Eligibility 5-40
5-196 Coast Tracks 5-40
5-197 Controller Initiated Coast Tracks 5-40
5-198—5-209 Reserved 5-40

Section 15. AUTOMATED RADAR TERMINAL SYSTEMS (ARTS) — TERMINAL

5-210 Application 5-41
5-211 Responsibility 5-41
5-212 Functional Use 5-41
5-213 System Requirements 5-41
5-214 Information Displayed 5-41
5-215 Conflict Alert 5-41
5-216 Inhibiting Minimum Safe Altitude Warning (MSAW) 5-41
5-217 Track Suspend Function 5-42
5-218—5-219 Reserved 5-42

Section 16. TPX-42 — TERMINAL

5-220 Application 5-43
5-221 Responsibility 5-43
5-222 Functional Use 5-43
5-223 System Requirements 5-43
5-224 Information Displayed 5-43
5-225 Altitude Filters 5-43
5-226 Inhibiting Low Altitude Alert System (LAAS) 5-43

Chapter 5. RADAR

Section 1. GENERAL

5-1 PRESENTATION AND EQUIPMENT PERFORMANCE

Provide radar service only if you are personally satisfied that the radar presentation and equipment performance is adequate for the service being provided.

5-1 Note. — The provision of radar service is not limited to the distance and altitude parameters obtained during the commissioning flight check.

5-2 ALIGNMENT CHECK

TERMINAL

a. Check alignment of the radar video display by assuring that the video map or overlay is properly aligned with a permanent target of known range and azimuth on the radar display. Where possible, check one permanent target per quadrant. This shall be accomplished as soon as possible after assuming responsibility of the control position. Additionally, periodic checks shall be made throughout the watch.

5-2a Reference. — Order 7210.3 — 380, Tolerance for Radar Fix Accuracy.

EN ROUTE

b. When operating in the broadband mode, apply the procedures in a. above.

c. When operating in the narrowband mode (STAGE A), assure the alignment of broadband backup radar according to the procedures in a. above as soon as possible after assuming responsibility of the control position.

5-2c Note. — During Stage A operation, alignment checking is accomplished by the operational program as part of the certification procedures for system startup and then on a real-time basis during operational hours.

5-3 RADAR USE

Use radar information derived from primary and Mode 3/A secondary radar systems.

5-3 Note. — Applicable FAA and military facility management directives outline equipment performance prerequisites, monitoring requirements, deficiency reporting, etc., for using radar. The aviation community is informed via AIM and Advisory Circulars of radar capabilities and constraints on controller services.

5-3 Reference. — Inoperative or Malfunctioning Interrogator, 5-35. Beacon Range Accuracy, 5-4.

a. Display and monitor both primary and secondary radar when available (see 5-3b. and 5-4), except that secondary radar may be used as the sole display source as follows:

(1) In PCA.

5-3a(1) Reference. — Failed Transponder in Positive Control Area, 5-36. FAR 91.97.

(2) Outside PCA, or where mix of PCA/non-PCA exists, only when:

(a) Additional coverage is provided by secondary radar beyond that of the primary radar.

(b) The primary radar is temporarily unusable or out of service. Advise pilots when these conditions exist.

Phraseology:

PRIMARY RADAR OUT OF SERVICE. TRAFFIC ADVISORIES AVAILABLE ON TRANSPONDER AIRCRAFT ONLY.

5-3a(2)(b) Note. — Advisory may be omitted when provided on ATIS and pilot indicates having ATIS information.

(c) *EN ROUTE:* A secondary radar system (e.g., a gap filler) is the only source of radar data for the area of service, and beacon range accuracy is assured as provided in 5-4 when the system is used for separation.

b. *TERMINAL:* Do not use only secondary radar to conduct surveillance (ASR) final approaches unless an emergency exists and the pilot concurs.

5-4 BEACON RANGE ACCURACY

a. Your may use beacon targets for separation purposes if beacon range accuracy is verified by one of the following methods:

5-4a Note 1. — The check for verification of beacon range accuracy accomplished by correlation of beacon and primary radar targets of the same aircraft is not a check of display accuracy. Therefore, it is not necessary that it be done using the same display with which separation is being provided, nor the same targets being separated.

5-4a Note 2. — Narrowband: Beacon range accuracy for automated narrowband display equipment is verified by AF personnel. Consequently, further verification by the controller is unnecessary.

(1) Correlate beacon and primary targets of the same aircraft (not necessarily the one being provided separation) to assure that they coincide.

(2) When beacon and primary targets of the same aircraft do not coincide, correlate them to assure that any beacon displacement agrees with the specified distance and direction for that particular radar system.

(3) Refer to beacon range monitoring equipment where so installed.

b. If beacon range accuracy cannot be verified, you may use beacon targets only for traffic information.

5-5 ECM/ECCM ACTIVITY

a. Refer all ECM/ECCM activity requests to the appropriate center supervisor.

5-5a Reference. — Snow Time, 8-36. 7610.4, Chap. 16, Sec.3, ECM Missions/Exercises.

5-5a Note. — ECM activity can subsequently result in a request to apply ECCM videos to the radar system which may necessitate the decertification of the narrowband search radar. The facility SE should be consulted concerning the effect of ECM/ECCM on the operational use of the radar (narrowband/broadband) prior to approving/disapproving requests to conduct ECM/ECCM activity.

b. When ECM activity interferes with the operational use of radar:

(1) *EN ROUTE:* Request the responsible military unit or aircraft, if initial request was received directly from pilot, to suspend the activity.

(2) *TERMINAL:* Request suspension of the activity through the ARTCC. If immediate cessation of the activity is required, broadcast the request directly to the ECM aircraft on the emergency frequency. Notify the ARTCC of direct broadcast as soon as possible.

c. When previously suspended activity will no longer interfere:

(1) *EN ROUTE:* Inform the NORAD unit or aircraft that it may be resumed.

(2) *TERMINAL:* Inform the ARTCC or aircraft that it may be resumed. Obtain approval from the ARTCC prior to broadcasting a resume clearance directly to the aircraft.

d. In each stop request, include your facility name, type of ECM activity (chaff dispensing — "stream"/"burst" — or electronic jamming — "buzzer"), radar band affected and, when feasible, expected duration of suspension.

Phraseology:

BIG PHOTO (identification, if known) (name) CENTER/TOWER/APPROACH CONTROL,

to stop ECM activity

STOP STREAM/BURST IN AREA (area name) (degree and distance from facility),

or

STOP BUZZER ON (frequency band or channel). To resume ECM activity RESUME STREAM/BURST,

or

RESUME BUZZER ON (frequency band or channel).

5-6 SERVICE LIMITATIONS

a. When radar mapping is not available, limit radar services to:

(1) Separating identified aircraft targets.

(2) Vectoring aircraft to intercept a PAR final approach course.

(3) Providing radar service in areas that ensure no confliction with traffic on airways, other ATC areas of jurisdiction, restricted or prohibited areas, terrain, control zones, etc.

b. *EN ROUTE:* Stage A — When the position symbol associated with the full data block falls more than one history behind the actual aircraft target or there is no target symbol displayed, the Mode C information in the full data block shall not be used for the purpose of determining separation.

c. Report radar malfunctions immediately for corrective action and for dispatch of a Notice to Airmen. Advise adjacent ATC facilities when appropriate.

5-6c Reference. — Responsibility for Reporting Essential Flight Information, 2-9.

5-7 ELECTRONIC CURSOR

TERMINAL

a. An electronic cursor may be used to aid in identifying and vectoring an aircraft and to give finer delineation to a video map. Do not use it as a substitute for a video map or map overlay; e.g., to form intersections, airway boundaries, final approach courses, etc.

b. Fixed electronic cursors may be used to form the final approach course for surveillance approaches conducted by military operated mobile radar facilities.

5-8 MERGING TARGET PROCEDURES

a. Except while they are established in a holding pattern, apply merging target procedures to all radar identified:

(1) Aircraft at 10,000 feet and above.

(2) Turbojet aircraft regardless of altitude.

5-8a(2) Reference. — Glossary (Turbojet Aircraft).

(3) Presidential aircraft regardless of altitude.

b. Issue traffic information to those aircraft listed in a. whose targets appear likely to merge unless the aircraft are separated by more than the appropriate vertical separation minima.

c. If the pilot requests, vector his aircraft to avoid merging with the target of previously issued traffic.

5-8c Note. — Aircraft closure rates are so rapid that when applying merging target procedures, controller issuance of traffic must be commenced in ample time for the pilot to decide if a vector is necessary.

d. If unable to provide vector service, inform the pilot.

5-9 HOLDING PATTERN SURVEILLANCE

Provide radar surveillance of outer fix holding pattern airspace areas, or any portions thereof, shown on your radar scope (displayed on the video map or scribed on the map overlay) whenever aircraft are holding there. Attempt to detect any that stray outside the area. If you detect an aircraft straying outside the area, assist it to return to the assigned airspace.

5-10 DEVIATION ADVISORIES

Inform an aircraft when it is observed in a position and on a track which will obviously cause the aircraft to deviate from its protected airspace area. If necessary, assist the aircraft to return to the assigned protected airspace.

5-11 RADAR FIX POSTING

EN ROUTE

At lease once in each sector, record on the flight progress strip the time of observed position of each aircraft in "radar contact" with respect to a fix shown on the radar display.

5-12 POSITION REPORTING

a. If necessary, you may request an aircraft to provide an estimate or report over a specific fix.

5-12a Note. — After an aircraft receives the statement "radar contact" from ATC, it discontinues reporting over compulsory reporting points. It resumes normal position reporting when ATC informs it "radar contact lost" or "radar service terminated."

5-12a Reference. — Glossary (Radar Contact).

b. When required, inform an aircraft of its position with respect to a fix or airway.

Phraseology:

OVER/PASSING (fix)

(Number of miles) MILES FROM (fix).

(Number of miles) MILES (direction) OF (fix, airway, or location).

CROSSING/JOINING/DEPARTING (airway or route).

INTERCEPTING/CROSSING (name of NAVAID) (specified) RADIAL.

5-13 RADAR SERVICE TERMINATION

a. Inform aircraft when radar service is terminated.

Phraseology:

RADAR SERVICE TERMINATED (nonradar routing, if required).

b. Radar service is automatically terminated and the aircraft need not be advised of termination in the following cases:

5-13b Note. — Termination of radar monitoring when conducting simultaneous ILS approaches is prescribed in 5-126h(3). Termination of radar monitoring where PAR equipment is used to monitor approaches is prescribed in 5-182e.

(1) An aircraft cancels its IFR flight plan, except within a TCA, TRSA, or where Stage II service is provided.

(2) An aircraft making an instrument approach has landed or the tower sights the aircraft whichever occurs first.

(3) An aircraft conducts a visual approach or contact approach and is advised to contact the tower.

(4) *TERMINAL:* An arriving VFR aircraft, receiving radar services, is advised to contact the tower.

(5) *TERMINAL:* At the completion of a radar approach.

5-14 thru 5-19 RESERVED

Section 2. BEACON SYSTEMS

5-20 ASSIGNMENT CRITERIA

a. General

(1) Mode 3/A is designated as the common military/civil mode for air traffic control use.

(2) Make radar beacon code assignments to only Mode 3/A transponder equipped aircraft.

b. Unless otherwise specified in a directive or a letter of agreement, make code assignments to departing, en route, and arrival aircraft in accordance with the procedures specified in this section for the radar beacon code environment in which you are providing ATC service. Give first preference to the use of discrete beacon codes.

Phraseology:

SQUAWK THREE/ALFA (code).

or

SQUAWK (code).

5-20b Note. — A code environment is determined by an operating position's/sector's equipment capability to decode radar beacon targets using either the first and second or all four digits of a beacon code.

5-21 DISCRETE ENVIRONMENT

a. Issue discrete beacon codes assigned by the computer. Computer assigned codes may be modified as required.

(1) *TERMINAL:* Aircraft that will remain within the terminal facility's delegated airspace shall be assigned a code from the code subset allocated to the terminal facility.

(2) *TERMINAL:* Aircraft that will enter an adjacent ARTS facility's delegated airspace shall be assigned a beacon code assigned by the ARTCC computer.

5-21a(2) Note. — This will provide the adjacent facility advance information on the aircraft and will cause auto-acquisition of the aircraft prior to handoff.

b. Make handoffs to other positions/sectors on the computer assigned code.

c. Coastal facilities accepting "over" traffic that will subsequently be handed-off to an oceanic ARTCC shall reassign a new discrete beacon code to an aircraft when it first enters the receiving facility's airspace. The code reassignment shall be accomplished by inputting an appropriate message into the computer and issued to the pilot while operating in the first sector/position in the receiving facility's airspace.

5-21c Note. — Per an agreement between the FAA and the Department of Defense, 18 code subsets in the NBCAP have been reserved for exclusive military use in oceanic airspace. To maximize the use of these code subsets, they have also been allocated to ARTCCs underlying NBCAP airspace that do not abut an oceanic ARTCC's area. In order to preclude a potential situation where two aircraft might be in the same airspace at the same time on the same discrete code, it is necessary to reassign an aircraft another code as specified in 5-21c.

5-22 NONDISCRETE ENVIRONMENT

a. Assign appropriate nondiscrete beacon codes from the function codes specified in 5-25.

b. Unless otherwise coordinated at the time of handoff, make handoffs to other positions/sectors on an appropriate nondiscrete function code.

5-23 MIXED ENVIRONMENT

a. When discrete beacon code capability does not exist in your area of responsibility, comply with the procedures specified in 5-22.

5-23 Note. — In a mixed code environment a situation may exist where a discrete equipped position/sector exchanges control of aircraft with nondiscrete equipped facilities or vice versa.

b. When discrete beacon code capability exists in your area of responsibility:

(1) Comply with the procedures specified in 5-21, and

(2) Unless otherwise coordinated at the time of handoff, assign aircraft that will enter the area of responsibility of a nondiscrete equipped position/sector an appropriate nondiscrete function code from the codes specified in 5-25 prior to initiating a handoff.

5-24 RADAR BEACON CODE CHANGES

Unless otherwise specified in a directive or a letter of agreement or coordinated at the time of handoff, do not request an aircraft to change from the code it was squawking in the transferring facility's area until the aircraft is within your area of responsibility.

5-25. FUNCTION CODE ASSIGNMENTS

Unless otherwise specified by a Directive or a letter of agreement, make nondiscrete code assignments from the following categories:

a. Assign codes to departing IFR aircraft as follows:

(1) Code 2000 to an aircraft which will climb to FL 240 or above, or to an aircraft which will climb to FL 180 or above where the base of PCA and the base of the operating sector are at FL 180, and for inter-facility handoff, the receiving sector is also stratified at FL 180. The en route code shall not be

assigned until the aircraft is established in the high altitude sector.

(2) Code 1100 to an aircraft which will remain below FL 240 or below FL 180 as in (1) above.

(3) For handoffs from terminal facilities when so specified in a Letter of Agreement as follows:

(a) Within NBCAP airspace — Code 0100 to code 0400 inclusive, or any other code authorized by the Regional Air Traffic Division.

(b) Outside NBCAP airspace — Code 1000 or one of the codes from 0100 to 0700 inclusive, or any other code authorized by the Regional Air Traffic Division.

b. Assign codes to en route IFR aircraft as follows:

5-25b Note. — FL 180 may be used in lieu of FL 240 where the base of PCA and the base of the operating sector are at FL 180 and for inter-facility handoff, the receiving sector is also stratified at FL 180. The provisions of (2)(b) and (2)(c) may be modified by facility directive or letter of agreement when operational complexities or simplified sectorization indicate. Letters of Agreement are mandatory when the operating sectors of two facilities are not stratified at identical levels. The general concept of utilizing codes 2100 through 2500 within PCA should be adhered to.

(1) Aircraft operating below FL 240, or when control is transferred to a controller whose area includes the stratum involved.

(a) Code 1000 may be assigned to aircraft changing altitudes.

(b) Code 1100 to an aircraft operating at an assigned altitude below FL 240. Should an additional code be operationally desirable, code 1300 shall be assigned.

(2) Aircraft operating at or above FL 240, or when control is transferred to a controller whose area includes the stratum involved.

(a) Code 2300 may be assigned to Aircraft changing altitudes.

(b) Code 2100 to an aircraft operating at an assigned altitude from FL 240 to FL 330 inclusive. Should an additional code be operationally desirable, code 2200 shall be assigned.

(c) Code 2400 to an aircraft operating at an assigned altitude from FL 350 to FL 600 inclusive. Should an additional code be operationally desirable, code 2500 shall be assigned.

(3) Code 4000 — When aircraft are operating on a flight plan specifying frequent or rapid changes in assigned altitude in more than one stratum, or other conditions of flight not compatible with a stratified code assignment.

5-25b(3) Note 1. — Categories of flight that can be assigned code 4000 include certain flight test aircraft, MTR missions, aerial refueling operation requiring descent involving more than one stratum, ALTRVs where continuous monitoring of ATC communications facilities is not required and frequent altitude changes are approved, and other aircraft operating on flight plans requiring special handling by ATC.

5-25b(3) Note 2. — Military aircraft operating VFR or IFR in restricted/warning areas or VFR on VR routes will adjust their transponders to reply on code 4000 unless another code has been assigned by ATC or coordinated, if possible, with ATC.

c. Assign the following codes to arriving IFR aircraft, except military turbojet aircraft as specified in 4-63:

5-25c Note. — FL 180 may be used in lieu of FL 240 where the base of PCA and the base of the operating sector are at FL 180 and for inter-facility handoff, the receiving sector is also stratified at FL 180.

(1) Code 2300 may be assigned for descents while above FL 240.

(2) Code 1500 may be assigned for descents into and while within the strata below FL 240, or with prior coordination, the specific code utilized by the destination controller or the code currently assigned when descent clearance is issued.

(3) The applicable en route code for the holding altitude if holding is necessary before entering the terminal area and the appropriate code in (1) or (2).

5-26 REVERTING TO BROADBAND

When the narrowband system is no longer available/usable for ATC purposes, aircraft operating on computer assigned codes shall be instructed to squawk the Function Code appropriate for your area of responsibility.

5-26 Note. — During the transition to the broadband mode, targets can be maintained by selecting on the broadband decoder equipment the codes in use by aircraft in your area or activating the "all" beacon feature.

Phraseology:

ALL AIRCRAFT ON THIS FREQUENCY SQUAWK (appropriate code).

5-27 EMERGENCY CODE ASSIGNMENT

Assign codes to emergency aircraft as follows:

a. Code 7700 when the pilot declares an emergency and the aircraft is not radar identified.

Phraseology:

SQUAWK MAYDAY ON 7700.

b. After radio and radar contact have been established, you may request other than single-piloted helicopters and single-piloted turbojet aircraft to change from code 7700 to another code appropriate for your radar beacon code environment.

5-27b Note 1. — The code change, based on pilot concurrence, the nature of the emergency, and current flight conditions will signify to other radar facilities that the aircraft in distress is identified and under ATC control.

5-27b Note 2. — Pilots of single-piloted helicopters and single-piloted turbojet aircraft may be unable to reposition transponder controls during the emergency.

Phraseology:

RADAR CONTRACT (position). IF FEASIBLE, SQUAWK (code).

5-28 RADIO FAILURE

When you observe a code 7600 display, apply the procedures in 9-43, Communications Failure.

5-28 Note. — Should a transponder equipped aircraft experience a loss of two-way radio communications capability, the pilot can be expected to adjust his transponder to code 7600.

5-29 VFR CODE ASSIGNMENTS

a. Provided the aircraft is within your area of responsibility or prior coordination has been affected with the facility/sector in whose area an aircraft is operating and an operational benefit will be gained, assign aircraft operating with a clearance specifying "VFR-on-top," "VFR conditions," or VFR aircraft receiving radar advisories an appropriate Function Code or computer-assigned code for the code environment in which you are providing service.

5-29a Note 1. — Paragraphs 5-21, 5-22, and 5-23 specify code assignments procedures to follow for the three code environments.

5-29a Note 2. — Paragraphs 5-25,a, b, and c, specify Function Code allocation from which an appropriate code for the aircraft indicated in 5-29a should be selected. In the terminal environment, additional Function Codes may be authorized by the regional Air Traffic Division.

b. Instruct IFR aircraft which cancel an IFR flight plan and are not requesting radar advisory service and VFR aircraft for which radar advisory service is being terminated to squawk the VFR code.

Phraseology:

SQUAWK 1200.

5-29b Note. — VFR aircraft which fly authorized SAR missions for the USAF or USCG may be advised to squawk 1277 in lieu of 1200 while en route to/from or within the designated search area.

5-29b Reference. — FAA Order 7110.66A, National Beacon Code Allocation Plan.

5-30 BEACON CODE FOR PRESSURE SUIT FLIGHTS AND FLIGHTS ABOVE FL 600

a. Mode 3/A, code 4400, and discrete codes 4401 through 4477 are reserved for use by R-71, F-12, U-2, B-57, pressure suit flights, and aircraft operations above FL 600.

5-30a Note. — The specific allocation of reserved codes in code subset 4400 may be found in NBCAP, Order 7110.66A.

b. Ensure aircraft remain on code 4400 or one of the reserved discrete codes if filed as part of the flight plan. Except when unforeseen events such as weather deviations, equipment failure, etc., cause more than one aircraft with same Mode 3/A discrete beacon codes to be in the same or adjacent ARTCC's airspace at the same time, a controller may request the pilot to make a code change, squawk standby, or to stop squawk as appropriate.

5-30b Note. — Due to the inaccessibility of certain equipment to the flight crews, code 4400 or a discrete code from the 4400 code subset is preset on he ground and will be used throughout the flight profile including operations below FL 600. Controllers should be cognizant that not all aircraft may be able to accept the transponder changes identified in the Exception. Emergency code 7700, however, can be activated.

5-31 AIR DEFENSE EXERCISE BEACON CODE ASSIGNMENT

EN ROUTE

Ensure exercise target aircraft remain on the exercise flight plan filed discrete beacon code except:

5-31 Note 1. — The Federal Aviation Administration and the North American Aerospace Defense Command (NORAD) have consummated a Memorandum of Understanding specifying procedures and beacon code allocation for handling target aircraft participating in Air Defense Exercises. NORAD will ensure exercise target aircraft flight plans are filed containing four digit discrete beacon code based on the altitude stratum filed in the exercise flight plan. Target aircraft flight planning for the high altitude stratum will be filed with beacon codes from the 6400 and 7100 subsets. Target aircraft flight planning for the low altitude stratum will be filed with beacon codes from 5400 and 6100 subsets.

5-31 Note 2. — Code 50(dd) will be used to indicate a target aircraft is unavailable or no longer safe for intercept. The third and fourth digits will be the same as those filed in the flight plan.

5-31 Note 3. — NORAD will ensure that those target aircraft assigned the same discrete beacon code are not flight planned in the same or any adjacent ARTCC's airspace at the same time. (Simultaneous assignment of codes will only occur when operational requirements necessitate.)

a. During periods of broadband operations, the first digit of the exercise flight plan filed discrete beacon code shall be changed by one digit to accommodate stratum changes as follows:

(1) Departing exercise target aircraft that flight planned in the high altitude stratum with a filed discrete beacon code from one of the high al-

titude subsets shall be issued a four digit discrete beacon code with the first digit one digit less than the filed discrete beacon code.

5-31a(1) Example. —

Exercise flight plan filed discrete beacon code 6412. On departure target aircraft would be issued code 5412. Prior to handoff to the high altitude sector, target aircraft would be issued code 6412.

(2) Exercise target aircraft operating in the high altitude stratum with a filed discrete beacon code from one of the high altitude stratum subsets that request descent to operate in the low altitude stratum or to descend from the high altitude stratum and land shall, prior to handoff to the low altitude sector, be issued a four digit discrete code with the first digit one digit less than the filed discrete beacon code.

5-31a(2) Example. —

Exercise flight plan filed discrete beacon code 6412. Prior to handoff to the low altitude sector, target aircraft would be issued code 5412. Target aircraft that subsequently request clearance to return to the high altitude stratum would be issued code 6412 prior to handoff to the high altitude sector.

(3) Exercise target aircraft operating in the low altitude stratum with a filed discrete beacon code from one of the low altitude stratum subsets that request clearance to operate in the high altitude stratum shall, prior to handoff to the high altitude sector, be issued a four digit discrete code with the first digit one digit greater than the filed discrete beacon code.

5-311(3) Example. —

Exercise flight plan filed discrete beacon code 5411. Prior to handoff to the high altitude sector, target aircraft would be issued code 6411. Target aircraft that subsequently request clearance to return to the low altitude stratum would be issued code 5411 prior to handoff to the low altitude sector.

(4) In the event of a RDP shutdown or system failure, exercise target aircraft squawking four digit discrete beacon codes from stratum subsets other than the stratum a target is operating in shall be issued a discrete code for that stratum. The four digit discrete beacon code shall be determined by adding or subtracting one digit to the exercise flight plan filed discrete beacon code that will result in the target squawking a discrete code from the appropriate stratum code subsets and retain the last three digits of the exercise flight plan filed discrete beacon code.

5-31a(4) Example. —

An exercise target aircraft operating in the low altitude stratum is squawking code 6412. A system failure occurs requiring the controller to revert to broadband. The exercise target aircraft would be issued code 5412.

(5) At all times the last three digits of the exercise flight plan filed discrete beacon code and the current code a target aircraft is squawking shall be the same.

b. In the event a code change becomes necessary, the controller shall insure the Faker Monitor Chief in the Defense Control Facility is advised as soon as feasible.

5-32 STANDBY OR LOW SENSITIVITY OPERATION

You may instruct an aircraft operating on an assigned code to change transponder to "standby" or "low sensitivity" position:

5-32 Note. — National standards no longer require improved transponder to be equipped with the low sensitivity feature. Therefore, aircraft with late model transponders will be unable to respond to a request to "squawk low."

a. When approximately 15 miles from its destination and you no longer desire operation of the transponder.

b. When necessary to reduce clutter in a multitarget area, or to reduce "ring-around" or other phenomena, provided you instruct the aircraft to return to "normal sensitivity" position as soon as possible thereafter.

Phraseology:

SQUAWK STANDBY,

or

SQUAWK LOW/NORMAL.

5-33 CODE MONITOR

Continuously monitor the Mode 3/A radar beacon codes assigned for use by aircraft operating within your area of responsibility.

5-33 Note 1. — When you are notified by pilots of VFR aircraft that they are unable to comply with VFR code changes because of high performance maneuvering requiring rapid transition through the altitudes where transponder changes should be made, you may assign (and monitor) whichever one of the VFR codes is most applicable to the situation. If appropriate, assign Code 4000.

5-33 Note 2. — At automated facilities, the computer equipment performs most of the beacon code monitor functions; therefore, not all codes used within the facility are required to be set up in the non-automated decoding equipment.

a. This includes the appropriate IFR code actually assigned and, additionally, Code 1200 and Code 1277 unless your area of responsibility includes only positive control airspace. During periods when ring-around or excessive VFR target presentations derogate the separation of IFR traffic, the monitoring of VFR code 1200 and Code 1277 may be temporarily discontinued.

b. Positions of operation which contain a restricted or warning area or VR route within or immediately adjacent to their area of jurisdiction shall monitor Code 4000 and any other code used in lieu of 4000 within the warning/restricted area or VR route. If by local coordination with the restricted/warning area or VR route user a code other than 4000 is to be exclusively used, then this code shall be monitored.

c. If a normally assigned beacon code disappears, check for a response on the following codes in the order listed and take appropriate action:

5-33c Note. — When codes 7500 and/or 7600 have been preselected, it will be necessary for the ID-SEL-OFF switches for these codes to be left in the OFF position so that beacon target for an aircraft changing to one of these codes will disappear, thereby alerting the controller to make the check. This check will not be required if automatic alerting capability exists.

(1) Code 7500 (hijack code).

5-33c(1) Reference. — Hijack Aircraft, 9-22.

(2) Code 7600 (loss of radio communications code).

5-34 FAILURE TO DISPLAY ASSIGNED BEACON CODE OR INOPERATIVE/MALFUNCTIONING TRANSPONDER

a. Inform an aircraft with an operable transponder that the assigned beacon code is not being displayed.

Phraseology:

(Identification) RESET TRANSPONDER, SQUAWK (appropriate code).

b. Inform an aircraft when its transponder appears to be inoperative or malfunctioning.

Phraseology:

(Identification) YOUR TRANSPONDER APPEARS INOPERATIVE/MALFUNCTIONING, RESET, SQUAWK (appropriate code).

c. Ensure that the subsequent control position in the facility or the next facility, as applicable, is notified when an aircraft transponder is malfunctioning/inoperative.

5-35 INOPERATIVE OR MALFUNCTIONING INTERROGATOR

Inform aircraft concerned when the ground interrogator appears to be inoperative or malfunctioning.

Phraseology:

(Name of facility or control function) BEACON INTERROGATOR INOPERATIVE/MALFUNCTIONING.

5-36 FAILED TRANSPONDER IN POSITIVE CONTROL AREA

Disapprove a request or withdraw previously issued approval to operate in positive control area with a failed transponder solely on the basis of traffic conditions or other operational factors.

5-37 VERIFICATION OF AUTOMATIC ALTITUDE READOUT

Consider an automatic altitude readout valid when it varies less than 300 feet above or below the pilot reported or known altitude. Readout variances of or in excess of 300 feet are invalid.

a. Assure that altitude readouts are valid prior to use for separation after initial track start, track start from coast/suspend tabular list, missing or unreasonable Mode C readouts, and after accepting an interfacility handoff. For TPX-42 and equivalent systems, determine that altitude readout is valid immediately following identification.

5-37a Note. — Missing Mode C altitude reports result in the altitude field being left blank. Unreasonable Mode C altitude reports may be indicated by XXX being displayed in the altitude field.

b. Request a pilot to verify altitude on initial contact unless:

5-37b Note. — It is not required that the aircraft be in level flight.

(1) The pilot states altitude and the readout is observed to be valid.

(2) The aircraft is established at an assigned altitude and the readout is observed to be valid.

(3) You receive a continuous readout from an aircraft on the airport which is observed to be valid when compared to field elevation.

5-37b(3) Note. — A continuous readout exists only when the altitude filter limits are set to include field elevation.

5-37b(3) Reference. — Altitude Filters, 5-225.

c. When unable to establish the readout as valid by pilot report or coordination, do not use the altitude for separation purposes.

d. Whenever you observe an invalid readout:

5-37d Note. — Aircraft equipped with a standby transponder may have dual Mode C capability.

(1) Verify that the pilot is using the correct altimeter setting and altitude.

Phraseology:

VERIFY ALTITUDE AND ALTIMETER SETTING.

(2) If the altimeter setting is correct and the discrepancy still exists, instruct him to turn off the altitude reporting portion of his transponder and tell him the reason.

Phraseology:

STOP ALTITUDE SQUAWK, ALTITUDE DIFFERS (number of feet) FEET.

e. Inhibit altitude readouts on all consoles, where possible, when a malfunction of ground equipment causes repeated invalid readouts.

5-38 AUTOMATIC ALTITUDE REPORTING

Inform an aircraft when you want it to turn on/off the automatic altitude reporting feature of its transponder.

Phraseology:

SQUAWK ALTITUDE,

or

STOP ALTITUDE SQUAWK.

5-38 Note. — Controllers should be aware that not all aircraft have a capability to disengage the altitude squawk independently from the beacon code squawk. On some aircraft both functions are controlled by the same switch.

5-38 Reference. — Altitude Verification, 5-37b. Glossary (Automatic Altitude Report).

5-39 IN-FLIGHT DEVIATIONS FROM TRANSPONDER/MODE C REQUIREMENTS BETWEEN 12,500 FEET AND 18,000 FEET.

The following procedures apply to all aircraft except gliders operating in controlled Conterminous U.S. airspace above 12,500 feet MSL and below 18,000 feet MSL, excluding airspace at and below 2,500 feet AGL.

5-39 Note. — FAR 91.24(b)(4) requires all aircraft except gliders operating in this stratum to be equipped with an operable coded radar beacon transponder having a Mode 3/A 4096 code capability, replying to Mode 3/A interrogation with the code specified by ATC, and equipped with automatic pressure altitude reporting equipment having a Mode C capability that automatically replies to Mode C interrogations by transmitting pressure altitude information in 100 foot increments.

5-39 Reference. — Order 7210.3 — 660.

a. Except in an emergency, do not approve in-flight requests for authorization to deviate from FAR 91.24(b)(4) requirements originated by aircraft without transponder equipment installed.

b. Approve or disapprove other in-flight deviation requests, or withdraw approval previously issued to such flights, solely on the basis of traffic conditions and other operational factors.

c. Adhere to the following sequence of action when an in-flight VFR deviation request is received from an aircraft with an inoperative transponder or Mode C, or is not Mode C equipped:

(1) Suggest that the aircraft conduct its flight in airspace unaffected by the FAR.

(2) Suggest that the aircraft file an IFR flight plan.

(3) Suggest that the aircraft provide a VFR route of flight and maintain radio contact with ATC.

d. Do not approve an in-flight deviation unless the aircraft has filed an IFR flight plan or a VFR route of flight is provided and radio contact with ATC is maintained.

e. You may approve an in-flight deviation request which includes airspace outside your jurisdiction without the prior approval of the adjacent ATC sector/facility providing a transponder/Mode C status report is forwarded prior to control transfer.

f. Approve or disapprove in-flight deviation requests within a reasonable period of time or advise when approval/disapproval can be expected.

5-40 BEACON TERMINATION

Inform an aircraft when you want it to turn off its transponder.

Phraseology:

STOP SQUAWK

For a military aircraft when you do not know if the military service requires that it continue operating on another mode

STOP SQUAWK (mode in use).

5-41 thru 5-49 RESERVED

Section 3. RADAR IDENTIFICATION

5-50 APPLICATION

Before your provide radar service, establish and maintain radar identification of the aircraft involved, except as provided in 5-70b(2) and 5-70b(3).

5-51 PRIMARY RADAR IDENTIFICATION METHODS

Identify a primary or radar beacon target by using one of the following methods:

a. Observing a departing aircraft target within 1 mile of the takeoff runway end.

b. Observing a target whose position with respect to a fix (displayed on the video map, scribed on the map overlay, or displayed as a permanent echo) or a visual reporting point (whose range and azimuth from the radar antenna has been accurately determined and made available to the controller) corresponds with a direct position report received from an aircraft, and the observed track is consistent with the reported heading or route of flight. If a TACAN/VORTAC is located within 6,000 feet of the radar antenna, the TACAN/VORTAC may be used as a reference fix for radar identification without being displayed on the video map or map overlay.

5-51b Note 1. — Establishment of radar identification through use of DME position information can be complicated by the fact that some military TACANs are not collocated with frequency-paired VORs and might be separated from them by as much as 31 miles.

5-51b Note 2. — Visual reporting points used for radar identification are limited to those most used by pilots and whose range and azimuth have been determined by supervisory personnel.

c. Observing a target make an identifying turn or turns of 30 degrees or more, provided the following conditions are met:

5-51c NOTE — Use of identifying turns or headings which would cause the aircraft to follow normal IFR routes or known VFR flight paths might result in misidentification. When these circumstances cannot be avoided, additional methods of identification may be necessary.

(1) Except in the case of a lost aircraft, a pilot position report is received which assures you that the aircraft is within radar coverage and within the area being displayed.

(2) Only one aircraft is observed making these turns.

(3) For aircraft operating in accordance with an IFR clearance, you either issue a heading away from an area which will require an increased minimum IFR altitude or have the aircraft climb to the highest minimum altitude in your are of jurisdiction before you issue a heading.

5-52 BEACON IDENTIFICATION METHODS

When using only Mode 3/A radar beacon to identify a target, use one of the following methods:

a. Request the aircraft to activate the "IDENT" feature of the transponder and then observe the identification display.

5-52a Note 1. — At facilities where the single-slash "IDENT" modification is installed or other decoder modifications have been made which increase the number of 'blooming' target displays, it will be necessary to exercise additional care to preclude the possibility of misidentification.

5-52a Note 2. — *TERMINAL:* When automated displays are operated in the analog mode, the "IDENT" return is displayed as a double slash and the emergency return as a single bloomer whenever the beacon control head is in the "FAIL" position.

Phraseology:

IDENT.

SQUAWK (code) AND IDENT.

b. Request the aircraft to change to a specific discrete or non-discrete code, as appropriate, and then observe the target or code display change. If a code change is required in accordance with Section 2 of this Chapter, use the codes specified therein.

c. Request the aircraft to change transponder to "standby." After you observe the target disappear for sufficient scans to assure that loss of target resulted from placing the transponder in "standby" position, request the aircraft to return transponder to normal operation and then observe the reappearance of the target.

Phraseology:

SQUAWK STANDBY,

then

SQUAWK (code).

d. *EN ROUTE:* During narrowband operations, an aircraft may be considered identified when the full data block is automatically associated with the beacon target symbol of an aircraft that is squawking a discrete code assigned by the computer.

Phraseology:

SQUAWK (4 digit discrete code), *and if aircraft has Mode C automatic altitude reporting and the equipment has been deactivated* AND ALTITUDE.

5-52d Note. — The AIM informs pilots to adjust Mode C transponders with altitude reporting capability activated unless deactivation is requested by ATC.

SQUAWK ALTITUDE is included to provide applicable phraseology.

5-53 ARTS/PIDP IDENTIFICATION METHODS

TERMINAL

a. Consider an auto-acquired aircraft as identified when its data block is displayed and is visible to you, not in coast, and one of the following conditions exist:

(1) Radar or beacon identification procedures have been used to confirm the identity of the tagged target.

(2) The aircraft is being handed off through use of NAS Stage A/ARTS, NAS Stage A/PIDP, or ARTS/ARTS automated handoff and "AM," "AMB," "TU," "NAT," "NB," or "CST" does not appear in the data block.

b. Use the ARTS/PIDP data block to maintain target identity unless it is in a coast status or displaced from the appropriate target.

c. Displaced data block shall be updated at all times.

5-54 QUESTIONABLE IDENTIFICATION

a. Use more than one method of identification when proximity of targets, duplication of observed action, or any other circumstances cause doubt as to target identification.

b. If identification is questionable for any reason, take immediate action to reidentify the aircraft or terminate radar service.

5-55 POSITION INFORMATION

Inform an aircraft of its position whenever radar identification is established by means of identifying turns or radar beacon procedures. Position information need not be given when identification is established by position correlation or when a departing aircraft is identified within 1 mile of the take-off runway end.

5-56 IDENTIFICATION STATUS

a. Inform an aircraft of radar contact when:

(1) Initial radar identification in the ATC system is established.

(2) Subsequent to loss of radar contact or terminating radar service, radar identification is reestablished.

Phraseology:

RADAR CONTACT (position, if required).

b. Inform an aircraft when radar contact is lost.

Phraseology:

RADAR CONTACT LOST (alternative instructions, when required).

5-57 TARGET MARKERS

EN ROUTE

a. Use radar target markers (shrimp boats/data blocks) on horizontal scopes to provide continuous target identity. Post flight identification and altitude, when constant, on markers. Post miscellaneous items (abbreviated route, vector headings, arrows to indicate climb or descent, etc.) at your discretion. To prevent misinterpretation, use standard hand printed characters.

b. Automated Systems — Use data blocks that are associated with the appropriate target symbol to provide continuous identity. Display flight identification, interim altitude or assigned altitude if interim altitude is not being used, and reported altitude as minimum display. Interim/assigned altitude, reported altitude, or flight identification, or all may be temporarily inhibited in NAS En Route Stage A to eliminate an existing data block overlap condition.

5-58 thru 5-59 RESERVED

Section 4. TRANSFER OF RADAR IDENTIFICATION

5-60 APPLICATION

To provide continuous radar service to an aircraft and facilitate a safe, orderly, expeditious flow of traffic, it is often necessary to transfer radar identification of an aircraft from one controller to another. This section describes the terms, methods, and responsibilities associated with this task. Inter- and intrafacility transfers of radar identification shall be accomplished in all areas of radar surveillance except where it is not operationally feasible. Where such constraints exist, they shall be:

a. Covered in letters of agreement which clearly state that control will not be based upon a radar handoff, or

b. Coordinated by the transferring and receiving controllers for a specified period of time.

5-61 TERMS

a. *Handoff* — An action taken to transfer the radar identification of an aircraft from one controller to another controller if the aircraft will enter the receiving controller's airspace and radio communications with the aircraft will be transferred.

b. *Radar Contact* — The term used to inform the controller initiating a handoff that the aircraft is identified and approval is granted for the aircraft to enter the receiving controller's airspace.

c. *Point Out* — An action taken by a controller to transfer the radar identification of an aircraft to another controller if the aircraft will or may enter the airspace or protected airspace of another controller and radio communications will not be transferred.

d. *Point Out Approved* — The term used to inform the controller initiating a point out that the aircraft is identified and that approval is granted for the aircraft to enter the receiving controller's airspace, as coordinated, without a communications transfer.

e. *Traffic* — A term used to transfer radar identification of an aircraft to another controller for the purpose of coordinating separation action. Traffic is normally issued (a) in response to a handoff or point out, (b) in anticipation of a handoff or point out, or (c) in conjunction with a request for control of an aircraft.

f. *Traffic Observed* — The term used to inform the controller issuing the traffic restrictions that the traffic is identified and that the restrictions issued are understood and will be complied with.

5-62 METHODS

a. Transfer the radar identification of an aircraft by at least one of the following methods:

(1) Physically point to the target on the receiving controller's display.

(2) Use landline voice communications.

(3) Use automation capabilities.

(4) *TERMINAL:* Use the "Modify" or "Quick Look" functions for data transfer between the TRACON and tower cab only if specific procedures are established in a facility directive. The local controller has the responsibility to determine whether or not conditions are adequate for the use of ARTS data on the BRITE.

5-62a(4) Reference. — Order 7210.3 — 1323, Use of ARTS Modify and Quick Look Functions

b. When using the above methods, comply with the Standard Operating Practice contained in Appendix 5.

c. When making a handoff, point out, or issuing traffic restrictions, relay information to the receiving controller in the following order:

(1) The position of the target relative to a fix, map symbol, or radar target known and displayed by both the receiving and transferring controller.

(2) The aircraft identification.

(3) The assigned altitude, appropriate restrictions, and information that the aircraft is climbing or descending, if applicable, except when inter/intrafacility directives ensure that the altitude information will be known by the receiving controller.

d. If any doubt as to target identification exists after attempting confirmation in accordance with this section, apply the provisions of paragraph 5-54, Questionable Identification.

5-63 TRAFFIC

a. When using the term "traffic" for coordinating separation, the controller issuing traffic shall issue appropriate restrictions.

b. The controller accepting the restrictions shall be responsible to ensure that approved separation is maintained between the involved aircraft.

5-64 TRANSFERRING CONTROLLER HANDOFF

The transferring controller shall:

a. Complete a radar handoff prior to an aircraft entering the airspace delegated to the receiving controller.

b. Verbally obtain the receiving controller's approval prior to making any changes to an aircraft's flight path, altitude, or data block information while the handoff is being initiated or after acceptance.

c. Ensure that potential conflicts are resolved prior to transferring communications and that restrictions issued to the aircraft to ensure separation are passed to the receiving controller.

d. Comply with restrictions issued by the receiving controller unless otherwise coordinated.

e. Transfer communications before an aircraft enters the receiving controller's area unless otherwise coordinated. To the extent possible, transfer communications when the handoff has been accepted.

5-64e Note. — Before ARTS Modify/Quick Look function is used to transfer radar identification, a facility directive which specifies communication transfer points is required.

f. Advise the receiving controller of pertinent information not contained in the data block of flight progress strip unless covered in a letter of agreement or facility directive. Pertinent information includes:

(1) Assigned heading.

(2) Air speed restrictions.

(3) Altitude information issued.

(4) Observed track or deviation from the last route clearance.

(5) The beacon code if different from that normally used or previously coordinated.

(6) Any other pertinent information.

g. Ensure that the data block is associated with the appropriate target.

h. Initiate verbal coordination to verify position of primary or nondiscrete targets when using the automated handoff function except for single sensor system intrafacility handoffs.

i. Initiate verbal coordination before transferring control of a track when "CST," "FAIL," "NONE," "NB," or "IF" is displayed in the data block.

j. Advise the receiving controller that radar monitoring is required when the aircraft is on a direct route initiated by ATC that exceeds usable navaid distances.

k. Issue restrictions to the receiving controller which are necessary to maintain separation from other aircraft within your area of jurisdiction before releasing control of the aircraft.

l. Consider the target being transferred as identified on the receiving controller's display when the receiving controller acknowledges receipt verbally or has accepted an automated handoff.

5-65 RECEIVING CONTROLLER HANDOFF

The receiving controller shall:

a. Ensure that the target position corresponds with the position given by the transferring controller or that there is an appropriate association between an automated data block and the target being transferred before accepting an handoff.

b. Issue restrictions that are needed for the aircraft to enter your sector safely before accepting the handoff.

c. Comply with restrictions issued by the initiating controller unless otherwise coordinated.

d. If you need to change an aircraft's heading, speed, altitude, or beacon code within another controller's area of jurisdiction, coordinate such changes with that controller and, as required, any intervening controller through whose area the aircraft will pass, prior to making the change, unless such changes are covered by a letter of agreement or facility directive.

e. After accepting a handoff from another controller, confirm the identity of primary target by advising the aircraft of its position, and of a beacon target by observing a code change, an "Ident" reply, or a "standby" squawk unless one of these was used during handoff. These provisions do not apply at those towers and GCAs which have been delegated the responsibility for providing radar separation within designated areas by the parent approach control facility and the aircraft identification is assured by sequencing or positioning prior to the handoff.

5-65e Reference. — Approach Separation Responsibility, 5-124.

f. When using appropriate equipment, consider a discrete beacon target's identity to be confirmed when:

(1) The data block associated with the target being handed off indicates the computer assigned discrete beacon code is being received, or

(2) You observe the deletion of a discrete code that was displayed in the data block, or

5-65f(2) Note. — When the aircraft generated discrete beacon code does not match the computer assigned beacon code, the code generated will be displayed in the data block. When the aircraft changes to the assigned discrete code, the code disappears from the data block. In this instance, the observance of code removal from the data block satisfies confirmation requirements.

(3) You observe the numeric display of a discrete code that an aircraft has been instructed to squawk or reports squawking.

g. Initiate verbal coordination prior to accepting control of a track when "CST," "NAT," "AMB," "NONE," "OLD," "NB," "TU," "AM," or "OL" is displayed in the data block.

(1) When an automated interfacility handoff action is initiated and "AMB" or "AM" is displayed in the full data block, advise the other facility that a disparity exists between the position declared by their computer and that declared by your ARTS/PIDP.

(2) When an automated interfacility handoff action is initiated and "NAT" or "TU" is displayed in the full data block, advise the other facility if a disparity exists between the position declared by their computer and the actual target position.

5-66 POINT OUT

a. The transferring controller shall:

(1) Obtain verbal approval before permitting an aircraft to enter the receiving controller's delegated airspace.

(2) Obtain the receiving controller's approval before making any changes to an aircraft's flight path, altitude, or data block information after the point out has been approved.

(3) Comply with restrictions issued by the receiving controller unless otherwise coordinated.

(4) Be responsible for subsequent radar handoffs and communications transfer, including flight data revisions and coordination, unless otherwise agreed to by the receiving controller or as specified in a letter of agreement.

b. The receiving controller shall:

(1) Ensure that the target position corresponds with the position given by the transferring controller or that there is an association between a computer data block and the target being transferred prior to approving a point out.

(2) Be responsible for separation between point out aircraft and other aircraft for which he/she has separation responsibility.

(3) Issue restrictions necessary to provide separation from other aircraft within his/her area of jurisdiction.

5-67 thru 5-69 RESERVED

Section 5. RADAR SEPARATION

5-70 APPLICATION

a. Radar separation shall be applied to all RNAV aircraft operating on a random (impromptu) route at or below FL 450.

b. Radar separation may be applied between:

(1) Radar identified aircraft.

(2) An aircraft taking off and another radar-identified aircraft when the aircraft taking off will be radar-identified within 1 mile of the runway end.

(3) A radar-identified aircraft and one not radar-identified when either is cleared to climb/descend through the altitude of the other provided:

(a) The performance of the radar system is adequate and, as a minimum, primary radar targets are being displayed on the display being used within the airspace within which radar separation is being applied, and

(b) Flight data on the aircraft not radar-identified indicate it is a type which can be expected to give adequate primary return in the area where separation is applied, and

(c) The airspace within which radar separation is applied is not less than the following number of miles from the edge of the radar display.

(i) When less than 40 miles from the antenna — *6 miles;*

(ii) When 40 miles or more from the antenna — *10 miles;*

(iii) Narrowband radar operations — *10 miles,* and

(d) Radar separation is maintained between the radar-identified aircraft and all observed primary and secondary radar targets until nonradar separation is established from the aircraft not radar identified, and

(e) When the aircraft involved are on the same relative heading, the radar-identified aircraft is vectored a sufficient distance from the route of the aircraft not radar identified to assure the targets are not superimposed prior to issuing the clearance to climb/descend.

5-71 TARGET SEPARATION

Apply radar separation:

a. Between the centers of primary radar targets; however, do not allow a primary target to touch another primary target or a beacon control slash.

b. Between the ends of beacon control slashes.

5-71b Note. — At TPX-42 sites, the bracket video feature must be activated to display the beacon control slash.

c. Between the end of a beacon control slash and the center of a primary target.

d. All-Digital Displays: Between the centers of digitized targets. Do not allow targets to touch.

5-72 MINIMA

Separate aircraft by the following minima:

5-72 Note. — Wake Turbulence procedures specify increased separation minima required for certain classes of aircraft because of the possible effects of wake turbulence.

a. Broadband Radar System:

(1) When less than 40 miles from the antenna — *3 miles.*

(2) When 40 miles or more from the antenna — *5 miles.*

EN ROUTE:

b. Stage A/DARC:

(1) When less than 40 miles from the antenna:

(a) Below FL 180 — *3 miles,* except where facility directives specify *5 miles* separation.

5-72b(1)(a) Note. — Exception: Where a significant operational advantage is obtained by modifying a radar site adaptation, Facility Directives are required to define the areas where 5-mile separation applies.

5-72b(1)(a) Reference. — Order 7210.3 — 1020, Single Site Coverage.

(b) FL 180 to below FL 600 — *5 miles.*

(c) At or above FL 600 — *10 miles.*

(2) When 40 miles or more from the antenna:

(a) Below FL 600 — *5 miles.*

(b) At or above FL 600 — *10 miles.*

c. EARTS:

(1) When less than 40 miles from the antenna — *3 miles.*

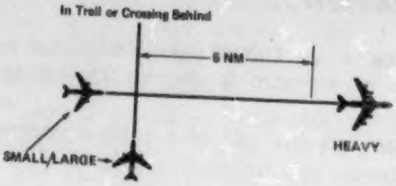
(2) When 40 miles or more from the antenna — *5 miles.*

WAKE TURBULENCE APPLICATION

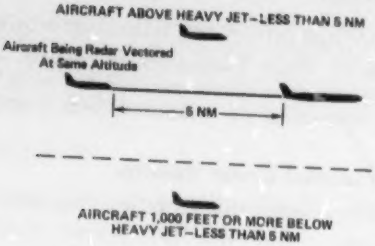
d. Separate aircraft operating directly behind, or directly behind and less than 1,000 feet below, or following an aircraft conducting an instrument approach by:

(1) Heavy behind heavy — *4 miles.*

(2) Small/large behind heavy — *5 miles.*



5-72d Illustration 1


AIRCRAFT ABOVE HEAVY JET—LESS THAN 5 NM
Aircraft Being Radar Vectored At Same Altitude
5 NM
AIRCRAFT 1,000 FEET OR MORE BELOW HEAVY JET—LESS THAN 5 NM

5-72d Illustration 2

e. *TERMINAL:* In addition to d, separate an aircraft landing behind another aircraft on the same runway, or one making a touch-and-go, stop-and-go, or low approach by ensuring the following minima will exist at the time the preceding aircraft is over the landing threshold:

(1) Small behind large — *4 miles.*

(2) Small behind heavy — *6 miles.*

5-72d,e NOTE — Consider parallel runways less than 2,500 feet apart as a single runway because of the possible effects of wake turbulence.

5-73 PASSING OR DIVERGING

Except when using a full digital system, vertical separation between aircraft may be discontinued when the following conditions are met:

a. You observe that they have passed each other or that one has crossed the projected course of another.

b. Their tracks are monitored to assure that their primary targets or beacon control slashes will not touch.

c. Their courses diverge at least 15 degrees.

5-73 Note 1. — Full digital systems are those systems where broadband radar data is not used in the separation of aircraft.

5-73 Note 2. — Although vertical separation may be discontinued, the requirements of 5-72d and e must be applied when operating behind a heavy jet.

5-74 ADDITIONAL SEPARATION FOR FORMATION FLIGHTS

Because of the distance allowed between formation aircraft and lead aircraft, additional separation is necessary to ensure the periphery of the formation is adequately separated from other aircraft, adjacent airspace, or obstructions. Provide supplemental separation for formation flights as follows:

a. Separate a standard formation flight by adding 1 mile to the appropriate radar separation minima.

5-74a Reference. — Formation Flights, 2-13; Application, 5-70; Separation, 7-92.; Glossary (Formation Flight).

b. Separate two standard formation flights from each other by adding 2 miles to the appropriate separation minima.

c. Separate a nonstandard formation flight by applying the appropriate separation minima to the perimeter of the airspace encompassing the nonstandard formation or from the outermost aircraft of the nonstandard formation, whichever applies.

d. If necessary for separation between a nonstandard formation and other aircraft, assign an appropriate beacon code to each aircraft in the formation or to the first and last aircraft in-trail.

5-74 Note. — The additional separation provided in 5-74 is not normally added to wake turbulence separation when a formation is following a heavier aircraft since none of the formation aircraft are likely to be closer to the heavier aircraft than the lead aircraft (to which the prescribed wake turbulence separation has been applied).

5-75 SEPARATION FROM OBSTRUCTIONS

a. Except in En Route Stage A/DARC, separate aircraft from prominent obstructions depicted on the radar scope (displayed on the video/geo map, scribed on the map overlay, or displayed as a permanent echo) by:

(1) A minimum of *3 miles* within 40 miles of the radar antenna.

(2) A minimum of *5 miles* beyond 40 miles of the radar antenna.

b. Except in En Route Stage A/DARC, vertical separation of aircraft above a prominent obstruction displayed as a permanent echo may be discontinued after the aircraft is passed it.

c. En Route Stage A/DARC: Apply the radar separation minima specified in 5-72b(1)(a).

5-75a,b, and c Note. — The determination of what constitutes a prominent obstruction is made locally after coordination with appropriate Flight Standards representatives.

5-76 ADJACENT AIRSPACE

a. If coordination between the controllers concerned has not been effected, separate radar-controlled aircraft from the boundary of adjacent airspace in which radar separation is also being used by the following minima:

5-76a Reference. — Coordinate Use of Airspace, 2-14.

(1) When less than 40 miles from the antenna — *1 ½ miles.*

(2) When 40 miles or more from the antenna — *2 ½ miles.*

(3) En Route Stage A/DARC:

(a) Below Flight Level 600 — *2 ½ miles.*

(b) Flight Level 600 and above — *5 miles.*

b. Separate radar-controlled aircraft from the boundary of airspace in which nonradar separation is being used by the following minima:

(1) When less than 40 miles from the antenna — *3 miles.*

(2) When 40 miles or more from the antenna — *5 miles.*

(3) En Route Stage A/DARC:

(a) Below Flight Level 600 — *5 miles.*

(b) Flight Level 600 and above — *10 miles.*

5-77 EDGE OF SCOPE

Separate a radar-controlled aircraft climbing or descending through the altitude of an aircraft that has been tracked to the edge of the scope/display by the following minima until nonradar separation has been established:

a. When less than 40 miles from the antenna — *3 miles* from edge of scope.

b. When 40 miles or more from the antenna — *5 miles* from edge of scope.

c. En Route Stage A/DARC:

(1) Below Flight Level 600 — *5 miles.*

(2) Flight Level 600 and above — *10 miles.*

5-78 BEACON TARGET DISPLACEMENT

When using a radar target display with a previously specified beacon target displacement to separate a beacon target from a primary target, adjacent airspace, obstructions, or terrain, add a 1-mile correction factor to the applicable minima.

5-78 Note. — The maximum allowable beacon target displacement which may be specified by the facility air traffic manager is 1/2 mile.

5-78 Reference. — Order 7210.3 — 373, Monitoring of Mode 3/A Radar Beacon Codes.

5-79 GPA 102/103 CORRECTION FACTOR

When using a radar display whose primary radar video is processed by the GPA 102/103 modification to a joint-use radar system, apply the following correction factors to the applicable minima:

a. If less than 40 miles from the antenna — add *1 mile.*

b. If 40 miles or more, but not over 200 miles, from the antenna — add *3 miles.*

5-80 thru 5-89 RESERVED

Section 6. VECTORING

5-90 APPLICATION

Vector aircraft:

a. In controlled airspace for separation, safety, noise abatement, operational advantage, or when a pilot requests. Allow aircraft operating on an RNAV route to remain on their own navigation to the extent possible.

b. In uncontrolled airspace only upon pilot request and as an additional service.

c. At or above MVA or the minimum IFR altitude except as authorized for missed approaches, radar approaches, departures, Special VFR and VFR operations.

5-90c Note. — VFR aircraft not at an altitude assigned by ATC may be vectored at any altitude. It is the responsibility of the pilot to comply with the applicable FARs.

5-90c References. — Minimum Enroute Altitudes, 4-44; Priority, 7-41; Altitude Assignment, 7-43, 7-94. FAR 91.79, Minimum Safe Altitudes.

d. In airspace for which you have control jurisdiction, unless otherwise coordinated.

e. So as to permit it to resume its own navigation within radar coverage.

f. Operating Special VFR only within control zones.

g. Operating VFR at those locations where a special program is established, or when a pilot requests, or you suggest and the pilot concurs.

5-90g Reference. — Order 7210.3, Chapter 13, Section 1, National Terminal Radar Program.

5-91 METHODS

a. Vector aircraft by specifying:

(1) Direction of turn, if appropriate, and magnetic heading to be flown, or

Phraseology:

TURN LEFT/RIGHT HEADING (degrees).

FLY HEADING (degrees).

FLY PRESENT HEADING.

DEPART (fix) HEADING (degrees).

(2) The number of degrees, in group form, to turn and the direction of turn, or

Phraseology:

TURN (number of degrees) DEGREES LEFT/RIGHT.

(3) For NO-GYRO procedures, the type of vector, direction of turn, and when to stop turn.

Phraseology:

THIS WILL BE A NO-GYRO VECTOR,

TURN LEFT/RIGHT.

STOP TURN.

b. When initiating a vector, advise the pilot of the purpose.

Phraseology:

FOR VECTOR TO (fix or airway).

FOR VECTOR TO INTERCEPT (name of NAVAID) (specified) RADIAL.

VECTOR FOR SPACING.

FOR VECTOR TO FINAL APPROACH COURSE,

or if the pilot does not have knowledge of the type of approach,

FOR VECTOR TO (approach name) FINAL APPROACH COURSE.

c. Issue with the vector an altitude to maintain and all appropriate altitude restrictions when:

(1) The vector will take the aircraft off an assigned procedure which contains altitude instructions, i.e., instrument approach, non-radar SID, etc.

(2) The previously issued clearance included crossing restrictions.

5-91c Reference. — Route or Altitude Amendments, 4-11.

d. If appropriate, advise the pilot what to expect when the vector is completed.

Phraseology:

EXPECT TO RESUME (route, SID, STAR, etc.).

5-91d Note. — You must ensure that the pilot is made aware if he is expected to resume a previously issued route/procedure.

e. Provide radar navigational guidance until the aircraft is:

(1) Established within the airspace to be protected for the nonradar route to be flown, or

(2) On a heading that will, within a reasonable distance, intercept the nonradar route to be flown, and

(3) Informed of its position unless the aircraft is RNAV or DME equipped and being vectored toward a VORTAC/TACAN or Waypoint and within the service volume of the NAVAID.

Phraseology:

(Position with respect to course/fix along route),
RESUME OWN NAVIGATION,

or

FLY HEADING (degrees) UNTIL RECEIVING (name) NAVAID/WAYPOINT, THEN PROCEED DIRECT,

or

RESUME (name-number SID/Transition/STAR/procedure).

5-91e(3) Reference. — NAVAID Use Limitations, Chapter 4, Section 1.

f. Aircraft instructed to resume a procedure which contains restrictions (SID/STAR, etc.) shall be issued/reissued all applicable restrictions or shall be advised to comply with those restrictions.

Phraseology:

RESUME (name-number SID/Transition/STAR), COMPLY WITH RESTRICTIONS.

g. Aircraft vectored off an RNAV route shall be recleared to the next waypoint or as requested by the pilot.

h. During Stage A operation, update the route of flight in the computer unless an operational advantage is gained and coordination is accomplished.

i. Inform the pilot when a vector will take the aircraft across a previously assigned nonradar route.

Phraseology:

EXPECT VECTOR ACROSS (NAVAID radial)(airway/route) FOR (purpose).

5-92 thru 5-99 RESERVED

Section 7. SPEED ADJUSTMENT

5-100 APPLICATION

a. Do not request speed adjustment of aircraft:

(1) At or above FL 290 without pilot consent.

(2) Executing a published high altitude instrument approach procedure.

(3) In a holding pattern.

(4) Cleared for approach, except that when action is necessary to maintain or achieve desired or required spacing and application of these procedures is preferable to S-turns or discontinuance of approach. If required, previously issued speed adjustments shall be restated if that speed is to be maintained or additional speed adjustments requested until the aircraft reaches the final approach fix or a point 5 miles from the runway, whichever is farther from the runway.

5-100a(4) Note. — Approach clearances supersede any prior speed adjustment assignments. Pilots are expected to make their own speed adjustments to complete the approach unless the controller has requested a speed adjustment. Controllers are expected to keep speed adjustments in this area to the minimum required to achieve or maintain required or desired spacing and to permit pilots to resume normal speed when this objective is achieved. It is the pilot's responsibility and prerogative to refuse speed adjustment that he considers excessive or contrary to the aircraft's operating specifications.

b. Express all speed ajustments in terms of knots based on indicated airspeed (IAS) in 10 knot increments, except that at or above FL 240 speeds may be expressed in terms of mach numbers in 0.01 increments for turbojet aircraft with mach meters (i.e., mach 0.69, 0.70, 0.71, etc).

5-100b Note. — Pilots complying with speed adjustment requests should maintain a speed within plus or minus 10 knots or 0.02 mach number of the specified speed.

c. Use mach numbers only to establish or maintain longitudinal separation between aircraft at the same altitude.

5-101 METHODS

a. Request aircraft to:

(1) Maintain present speed.

(2) Increase or reduce to a specified speed or by a specified number of knots.

(3) Avoid exceeding a specified speed.

Phraseology:

SAY AIRSPEED.

SAY MACH NUMBER.

INCREASE/REDUCE SPEED:

TO (specified speed in knots),

or

TO MACH (mach number),

or

(number of knots) KNOTS

DO NOT EXCEED (speed) KNOTS,

or

MACH (mach number).

5-101a Examples. —

"Increase speed to mach point seven two."

"Reduce speed to two five zero."

"Reduce speed two zero knots."

"Do not exceed mach point seven four."

(4) Only if the pilot concurs, reduce to a specified speed or amount less than the minimum speeds in 5-102.

Phraseology:

IF PRACTICAL, REDUCE SPEED:

TO (specified speed in knots),

or

TO MACH (mach number),

or

(number of knots) KNOTS.

5-101a Note. — A pilot operating above 10,000 feet MSL on an assigned speed adjustment greater than 250 knots is expected to comply with FAR 91.70(a) when cleared below 10,000 feet MSL without notifying ATC. Pilots are expected to comply with the other provisions of FAR 91.70 without notification unless otherwise authorized by ATC.

b. Specify which action is expected first when combining speed reduction with a descent clearance.

(1) Speed reductions prior to descent.

Phraseology:

REDUCE SPEED:

TO (specified speed),

or

(number of knots) KNOTS.

THEN, DESCEND AND MAINTAIN (altitude).

(2) Speed reduction following descent.

Phraseology:

DESCEND AND MAINTAIN (altitude).

THEN, REDUCE SPEED:

TO (specified speed in knots),

or

TO MACH (mach number),

or

(number of knots) KNOTS.

5-101b Note 1. — Simultaneous speed reduction and descent can be extremely difficult, particularly for tur-

bojet aircraft. Specifying which action is to be accomplished first removes any doubt the pilot may have as to controller intent or priority.

5-101b Note 2. — When specifying descent prior to speed reduction, consider the maximum speed requirements specified in FAR 91.70. It may be necessary for the pilot to level off temporarily and reduce speed prior to descending below 10,000 feet MSL.

c. Specify combined speed/altitude fix crossing restrictions.

Phraseology:

CROSS (fix) AT AND MAINTAIN (altitude) AT (specified speed) KNOTS.

5-101c Example. —

"Cross Robinsville at and maintain six thousand at two three zero knots."

5-102 MINIMA

Unless a pilot concurs in the use of a lower speed, use the following minima:

a. To aircraft operating between FL 280 and 10,000 feet, a speed not less than 250 knots or the equivalent mach number.

5-102a Note. — On a standard day the mach numbers equivalent to 250 knots CAS (subject to minor variations) are: FL 240 — 0.6; FL 250 — 0.61; FL 260 — 0.62; FL 270 — 0.64; FL 280 — 0.65; FL 290 — 0.66.

b. To arrival aircraft operating below 10,000 feet:

(1) Turbine powered aircraft — A speed not less than 210 knots; except when the aircraft is within 20 flying miles of the runway threshold of the airport of intended landing, a speed not less than 170 knots.

(2) Reciprocating engine and turboprop aircraft — A speed not less than 150 knots when the aircraft is within 20 flying miles of the runway threshold of the airport of intended landing.

c. Departures:

(1) Turbine powered aircraft — A speed not less than 230 knots.

(2) Reciprocating engine and turboprop aircraft — A speed not less than 150 knots.

5-103 LIMITATIONS

Accomplish speed adjustment to aircraft which cannot attain the minimum speeds set forth in 5-102 by requesting such flights to, if practical:

a. Maintain a specified speed equivalent to that of the preceding or succeeding aircraft, or

b. Increase or decrease speed utilizing increments of 10 knots or multiples thereof.

Phraseology:

IF PRACTICAL, MAINTAIN (specific speed),

or

IF PRACTICAL, INCREASE/REDUCE SPEED (specified knots) KNOTS.

5-104 TERMINATION

Advise aircraft when speed adjustment is not longer needed.

Phraseology:

RESUME NORMAL SPEED.

5-105 thru 5-109 RESERVED

Section 8. RADAR DEPARTURES

5-110 PROCEDURES

Use standard departure routes and channelized altitudes whenever practical to reduce coordination. Do not, however, assign these routes solely to provide for possible radar or communication failure.

5-111 INITIAL HEADING

Before departure, assign the initial heading to be flown if a departing aircraft is to be vectored immediately after takeoff.

Phraseology:

FLY RUNWAY HEADING.

TURN LEFT/RIGHT, HEADING (degrees).

5-111 Note. — *TERMINAL:* A purpose for the heading is not necessary, since pilots operating in a radar environment associate assigned headings with vectors to their planned route of flight.

5-111 Reference. — Clearances, 4-21.

5-112 VECTORS BELOW MINIMUM ALTITUDE

Except in en route automated environments in areas where more than 3 miles separation minima is required, you may vector a departing IFR aircraft, or one executing a missed approach, within 40 miles of the antenna and before it reaches the minimum altitude for IFR operations if separation from prominent obstructions shown on the radar scope is applied in accordance with the following:

a. If the flight path is 3 miles or more from the obstruction and the aircraft is climbing to an altitude at least 1,000 feet above the obstruction, vector the aircraft to maintain at least 3 miles separation from the obstruction until the aircraft reports leaving an altitude above the obstruction.

b. If the flight path is less than 3 miles from the obstruction, and the aircraft is climbing to an altitude at least 1,000 feet above the obstruction, vector the aircraft to increase lateral separation from the obstruction until the 3-mile minimum is achieved or until the aircraft reports leaving an altitude above the obstruction.

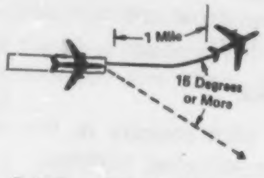
5-113 SUCCESSIVE OR SIMULTANEOUS DEPARTURES

TERMINAL

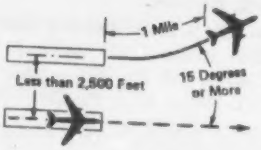
Separate aircraft departing from the same airport or adjacent airports in accordance with the following minima provided radar identification with the aircraft will be established within 1 mile of the takeoff runway end and courses will diverge by 15 degrees or more.

5-113 Note. — Order 8260.19, Flight Procedures and Airspace, establishes guidelines for IFR departure turning procedures which assumes a climb to 400 feet before a turn is commenced. Order 8290.3, TERPS, the ILS missed approach criteria require a straight climb of 400 feet be specified where turns greater than 15 degrees are required.

a. Between aircraft departing the same runway, or parallel runways separated by less than 2,500 feet — 1 mile if courses diverge immediately after departure.



5-113a Illustration 1



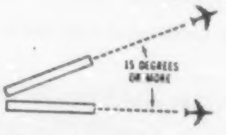
5-113a Illustration 2

5-113a Note. — This procedure does not apply when Category I or II aircraft are taking off from an intersection on the same runway behind a preceding departing Category III aircraft or when aircraft are departing behind a heavy jet.

5-113a Reference. — Intersection Takeoff Separation, 3-108; Intersection Takeoff, 3-107; Minima, 5-72.

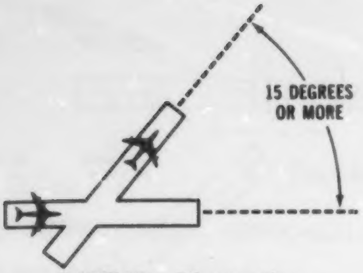
b. Between aircraft departing from diverging runways:

(1) Nonintersecting runways — Authorize simultaneous takeoffs if runways diverge by 15 degrees or more.



5-113b(1) Illustration

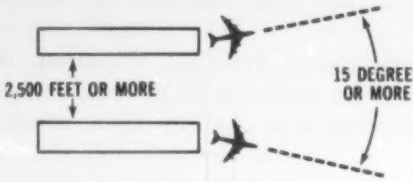
(2) Intersecting runways which diverge by 15 degrees or more — Authorize takeoff of a succeeding aircraft when the preceding aircraft has passed the point of runways intersection. When applicable, apply the procedure in 3-104.


15 DEGREES
OR MORE

5-113b(2) Illustration

5-113b(2) Note. — This procedure does not apply when aircraft are departing behind a heavy jet.

c. Between aircraft departing in the same direction from parallel runways — Authorize simultaneous takeoffs if the centerlines are separated by at least 2,500 feet and courses diverge immediately after departure.


2,500 FEET OR MORE
15 DEGREES
OR MORE

5-113c Illustration

5-114 DEPARTURE AND ARRIVAL

TERMINAL

Except as provided in 5-115, separate a departing aircraft from an arriving aircraft on final approach by a minimum of *2 miles* if separation will increase to a minimum of 3 miles (5 miles when 40 miles or more from the antenna) within 1 minute after takeoff.

5-114 Note 1. — This procedure permits a departing aircraft to be released so long as an arriving aircraft is no closer than 2 miles from the runway at the time. This separation is determined at the time the departing aircraft commences takeoff roll.

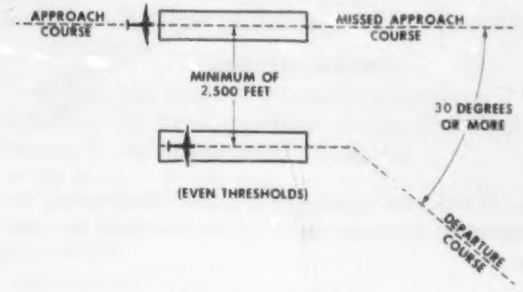
5-114 Note 2. — Consider the effect surface conditions, such as ice, snow, and other precipitation may have on known aircraft performance characteristics, and the influence these conditions may have on the pilot's ability to commence takeoff roll in a timely manner.

5-115 DEPARTURES AND ARRIVALS ON PARALLEL OR NONINTERSECTING DIVERGING RUNWAYS

TERMINAL

Authorize simultaneous operations between an aircraft departing on a runway and an aircraft on final approach to another parallel or nonintersecting diverging runway if the departure course diverges immediately by at least 30 degrees from the missed approach course until separation is applied and provided one of the following conditions are met:

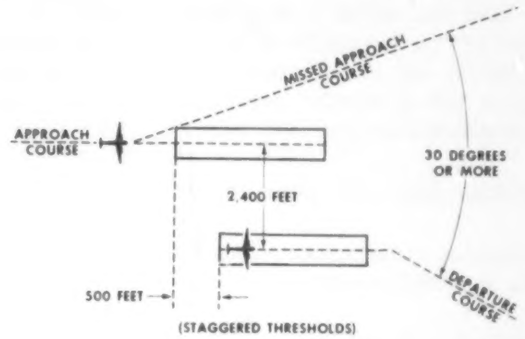
a. When parallel runway thresholds are even, the runway centerlines are at least 2,500 feet apart.


APPROACH COURSE
MISSED APPROACH COURSE
MINIMUM OF 2,500 FEET
30 DEGREES OR MORE
(EVEN THRESHOLDS)
DEPARTURE COURSE

5-115a Illustration

b. When parallel runway thresholds are staggered and:

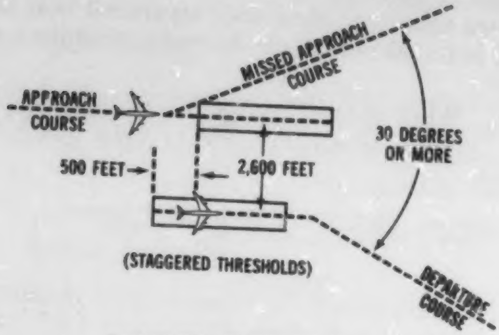
(1) The arriving aircraft is approaching the nearer runway — The centerlines are at least 1,000 feet apart and the landing thresholds are staggered at least 500 feet for each 100 feet less than 2,500 the centerlines are separated.


MISSED APPROACH COURSE
APPROACH COURSE
30 DEGREES OR MORE
2,400 FEET
500 FEET
(STAGGERED THRESHOLDS)
DEPARTURE COURSE

5-115b(1) Illustration

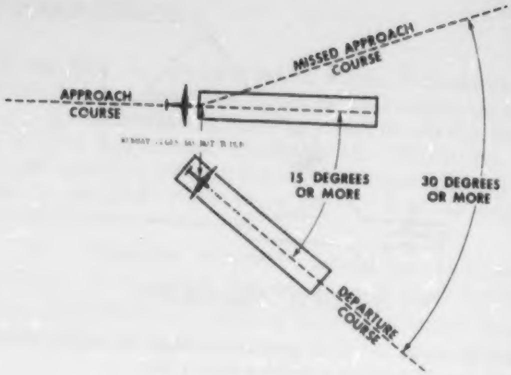
5-115b(1) Note. — In the event of a missed approach by a heavy jet, apply the procedures in 3-108 or ensure that the heavy jet does not overtake an aircraft departing from the adjacent parallel runway.

(2) The arriving aircraft is approaching the farther runway — The runway centerline separations exceeds 2,500 feet by at least 100 feet for each 500 feet the landing thresholds are staggered.


APPROACH COURSE
MISSED APPROACH COURSE
30 DEGREES OR MORE
500 FEET
2,600 FEET
(STAGGERED THRESHOLDS)
DEPARTURE COURSE

5-115b(2) Illustration

c. When nonintersecting runways diverge by 15 degrees or more and runway edges do not touch.


APPROACH COURSE
MISSED APPROACH COURSE
15 DEGREES OR MORE
30 DEGREES OR MORE
DEPARTURE COURSE

5-115c Illustration

5-116 thru 5-119 RESERVED

Section 9. RADAR ARRIVALS

5-120 VECTORS TO FINAL APPROACH COURSE

Except as provided in 7-31, vector arriving aircraft to intercept the final approach course:

a. At least 2 miles outside the approach gate unless one of the following exists:

(1) When the reported ceiling is at least 500 feet above the MVA and the visibility is at least 3 miles (report may be a PIREP if no weather is reported for the airport), aircraft may be vectored to intercept the final approach course closer than 2 miles outside the approach gate, but no closer than the approach gate.

(2) If specifically requested by the pilot, aircraft may be vectored to intercept the final approach course inside the approach gate, but no closer than the final approach fix.

b. For a precision approach, at an altitude not above the glide slope.

c. For a nonprecision approach, at an altitude which will allow descent in accordance with the published procedure.

5-120c Note. – A pilot request for an "evaluation approach," or a "coupled approach," or use of a similar term, indicates he desires the application of 5-120a. and b.

5-121 FINAL APPROACH COURSE INTERCEPTION

Assign headings that will permit final approach course interception on a track that does not exceed the interception angles specified in the Table.

5-121 Note. – The intent is to provide for a track-course intercept angle judged by the controller to be no greater than specified by this procedure.

5-121 Reference. – Approaches, Chapter 5, Sections 10 and 11.

5-121 Table. – Approach Course Interception Angle.

Distance from interception point to approach gate	*Maximum interception angle*
Less than 2 miles	20 degrees
2 miles or more	30 degrees (45 degrees for helicopters)

5-122 VECTORS ACROSS FINAL APPROACH COURSE

Inform the aircraft whenever a vector will take it across the final approach course and state the reason for such action.

5-122 Note. – In the event you are unable to so inform the aircraft, the pilot is not expected to turn inbound on the final approach course unless approach clearance has been issued.

Phraseology:

EXPECT VECTOR ACROSS FINAL APPROACH COURSE FOR (purpose).

5-122 Example. –

"Expect vector across final approach course for spacing."

5-123 ARRIVAL INSTRUCTIONS

Issue all of the following to an aircraft before it reaches the approach gate:

a. Position relative to a fix on the final approach course. If none is portrayed on the radar display or if none is prescribed in the procedure, issue position information relative to the navigation aid which provides final approach guidance or relative to the airport.

b. Vector to intercept the final approach course, if required.

c. Approach clearance except when conducting a radar approach. Issue approach clearance only after the aircraft is:

(1) Established on a segment of a published route or instrument approach procedure, or

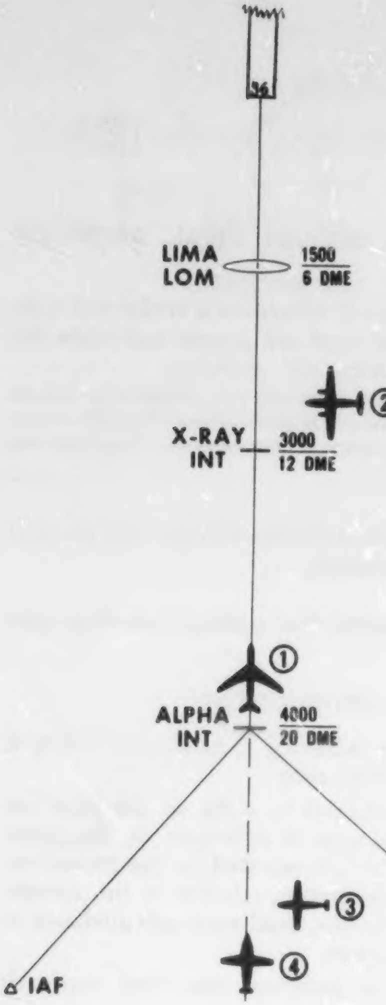
5-123c(1) Example. –

Aircraft 1 was vectored to the final approach course, but clearance was withheld. It is now at 4,000 feet and established on a segment of the instrument approach procedure. "Seven miles from X-ray. Cleared for I-L-S Runway Three Six Approach."

(2) Assigned an altitude to maintain until the aircraft is established on a segment of a published route or instrument approach procedure.

5-123c(2) Example 1. –

Aircraft 2 is being vectored to a published segment of the final approach course, 4 miles from Lima at 2,000 feet. The MVA for this area is 2,000 feet. "Four miles from Lima. Turn right heading three four zero. Maintain two thousand until established on the localizer. Cleared for I-L-S Runway Three Six Approach."



5-123c Illustration

5-123c(2) Example 2. –

Aircraft 3 is being vectored to intercept the final approach course beyond the approach segments, 5 miles from Alpha at 5,000 feet. The MVA for this area is 4,000 feet. "Five miles from Alpha. Turn right heading three three zero. Cross Alpha at or above four thousand. Cleared for I-L-S Runway Three Six Approach."

5-123c(2) Example 3. –

Aircraft 4 is established on the final approach course beyond the approach segments, 8 miles from Alpha at 6,000 feet. The MVA for this area, is 4,000 feet. "Eight miles from Alpha. Cross Alpha at or above four thousand. Cleared for I-L-S Runway Three Six Approach."

5-123c(2) Note 1. – The altitude assigned must assure IFR obstruction clearance from the point at which the approach clearance is issued until established on a segment of a published route or instrument approach procedure.

5-123c(2) Note 2. – If the altitude assignment is VFR-on-top, it is conceivable that the pilot may elect to remain high until arrival over the final approach fix which may require the pilot to circle to descend so as to cross the final approach fix at an altitude that would permit landing.

d. Instructions to do one of the following:

5-123d Note. – The principal purpose of this paragraph is to ensure that frequency changes are made prior to passing the final approach fix. However, at times it will be desirable to retain an aircraft on the approach control frequency to provide a single-frequency approach or other radar services. When this occurs, it will be necessary to relay tower clearances or instructions to preclude changing frequencies prior to landing or approach termination.

(1) Monitor local control frequency, reporting to the tower when over the approach fix.

(2) Contact the tower on local control frequency.

5-123d(2) Reference. – Communications Release, 4-87.

(3) Contact the final controller on the appropriate frequency if radar service will be provided on final on a different frequency.

5-123d(3) Reference. – Final Controller Changeover, 5-137.

(4) When radar is used to establish the final approach fix, inform the pilot that after being advised that he is over the fix he is to contact the tower on local control frequency.

5-123d(4) Example. –

"Three miles from final approach fix. Turn left heading zero one zero. Maintain two thousand until established on the localizer. Cleared for I-L-S Runway Three Six Approach. I will advise when over the fix."

"Over final approach fix. Contact tower one one eight point one."

5-123d(4) Note. – ARSR may be used for establishment of initial approach and intermediate approach fixes only. ASR must be used to establish the final approach fix.

5-124 APPROACH SEPARATION RESPONSIBILITY

a. The radar controller performing the approach control function is responsible for separation of radar arrivals unless visual separation is provided by the tower, or a letter of agreement/facility directive authorizes otherwise. Radar final controllers ensure that established separation is maintained between aircraft under their control and other aircraft established on the same final approach course.

5-124a Note. – The radar controller may be a controller in an ARTCC, a terminal facility, or a tower controller when authorized to perform the approach control function in a terminal area.

5-124a Reference. – Visual Separation, 7-10; Radar Separation, 5-70; Wake Turbulence, 2-19, 5-72. Order 7210.3 – 212, Delegation of Radar Approach Control Authority to a Nonapproach Control Tower.

b. When timed approaches are being conducted, the radar controller shall maintain the radar separation specified in 6-64 until the aircraft is observed to have passed the final approach fix inbound and is within 5 miles of the runway on the final approach course or until visual separation can be provided by the tower.

5-125 PARALLEL ILS APPROACHES

TERMINAL

When conducting parallel ILS approaches:

a. Provide a minimum of 1,000 feet vertical or a minimum of 3 miles radar separation between aircraft during turn on.

b. Provide a minimum of 3 miles radar separation between aircraft on the same localizer course.

c. Provide a minimum of 2 miles radar separation between successive aircraft on adjacent localizer courses when the following conditions are met:

(1) Runway centerlines are at least 2,500 feet apart.

(2) Apply this separation standard only after aircraft are established on the localizers.

(3) Straight-in landings will be made.

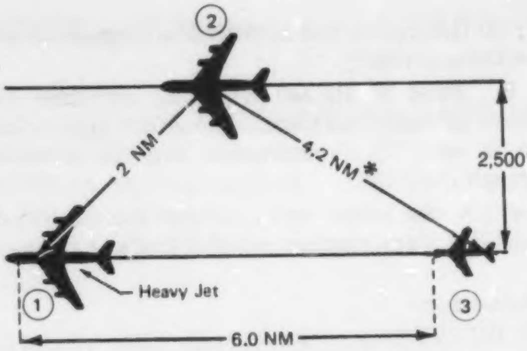
(4) Missed approach procedures do not conflict.

(5) Aircraft are informed that approaches to both runways are in use. This information may be provided through the ATIS.

(6) Approach control shall have the interphone capability of communicating directly with the local controller at locations where separation responsibility has not been delegated to the tower.

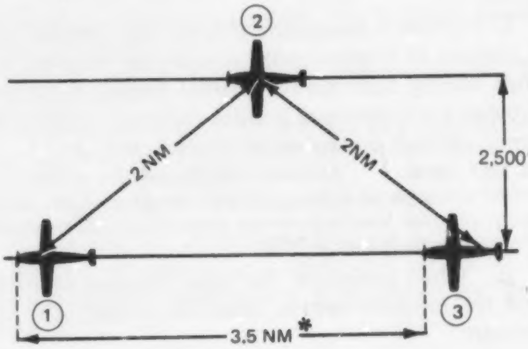
5-125c(6) Note. – The interphone capability is an integral part of this procedure when approach control has the sole separation responsibility.

5-125c(6) Reference. – Approach Separation Responsibility, 5-124; Order 7210.3 – 212, Delegation of Radar Approach Control Authority to a Nonapproach Control Tower.



5-125c Illustration 1

In this illustration, aircraft 2 is two miles from heavy aircraft 1. Aircraft 3 is a small aircraft and is six miles from aircraft 1. *The resultant separation between aircraft 2 and 3 is 4.2 miles.



5-125c Illustration 2

In this illustration, aircraft 2 is two miles from aircraft 1, and aircraft 3 is two miles from aircraft 2. *The resultant separation between aircraft 1 and 3 is more than 3.5 miles.

d. Consideration should be given to known factors that may in any way affect the safety of the instrument approach phase of flight, such as surface wind direction and velocity, wind shear alerts/reports, severe weather activity, etc. Closely monitor weather activity that could impact the final approach course. Weather conditions in the vicinity of the final approach course may dictate a change of approach in use.

5-126 SIMULTANEOUS ILS APPROACHES

TERMINAL

a. When parallel runways are at least 4,300 feet apart, authorize simultaneous ILS approaches to parallel runways if:

(1) Straight-in landings will be made.

(2) ILS, radar, and appropriate frequencies are operating normally.

b. Prior to aircraft departing an outer fix, inform aircraft that simultaneous ILS approaches are in use. This information may be provided through the ATIS.

c. On the initial vector, inform the aircraft of the ILS runway number and the localizer frequency.

Phraseology:

ILS RUNWAY (runway number) (left/right). LOCALIZER FREQUENCY IS (frequency).

d. Clear the aircraft to descend to the appropriate glide slope intercept altitude soon enough to provide a period of level flight to dissipate excess speed. Provide at least 1 mile of straight flight prior to localizer course intercept.

e. Vector the aircraft to intercept the final approach course at an angle not greater than 30 degrees.

f. Provide a minimum of 1,000 feet vertical or a minimum of 3 miles radar separation between aircraft during turn on to parallel localizer courses. Provide a minimum of 3 miles radar separation between aircraft on the same localizer course.

5-126f Note. – Aircraft established on a localizer course are separated from aircraft established on an adjacent parallel localizer course provided neither aircraft penetrates the depicted NTZ.

g. When assigning the final heading to intercept the localizer course, issue the following to the aircraft:

(1) Position from a fix on the localizer course.

(2) An altitude to maintain until established on the localizer course.

5-126g(2) Reference. – Arrival Instructions, 5-123.

(3) Clearance for the appropriate ILS runway number approach.

Phraseology:

POSITION (number) MILES FROM (fix). TURN (left/right) HEADING (degrees). MAINTAIN (altitude) UNTIL ESTABLISHED ON THE LOCALIZER. CLEARED FOR ILS RUNWAY (number)(left/right) APPROACH.

h. Monitor all approaches regardless of weather. Monitor local control frequency to receive any aircraft transmission. Issue control instructions and information necessary to ensure separation between aircraft and to ensure aircraft do not enter the "no transgression zone" (NTZ).

5-126h Note 1. – Separate monitor controllers, each with transmit/receive and override capability on local control frequency, shall ensure aircraft do not penetrate the depicted NTZ. Facility directives shall delineate responsibility for providing a minimum of 3 miles longitudinal separation between aircraft on the same localizer course.

5-126h Note 2. – An NTZ at least 2,000 feet wide is established equidistant between runway centerlines extended and is depicted on the monitor display. The primary responsibility for navigation on the localizer rests with the pilot. Therefore, control instructions and information are issued only to ensure separation between aircraft and that aircraft do not penetrate the NTZ. Pilots are not expected to acknowledge those transmissions unless specifically requested to do so.

5-126h Note 3. – For the purposes of ensuring an aircraft does not penetrate the NTZ, the "aircraft" is considered the center of the primary radar return for that aircraft. The provisions of 5-71 apply also.

(1) When aircraft are observed to overshoot the turn on or to continue on a track which will penetrate the NTZ, instruct the aircraft to return to the correct localizer immediately.

Phraseology:

YOU HAVE CROSSED THE LOCALIZER COURSE. TURN (left/right) IMMEDIATELY AND RETURN TO LOCALIZER COURSE,

or

TURN (left/right) AND RETURN TO LOCALIZER COURSE.

(2) When an aircraft is observed penetrating the NTZ, instruct aircraft on the adjacent localizer to alter course to avoid the deviating aircraft.

Phraseology:

TURN (left/right) HEADING (degrees) IMMEDIATELY, CLIMB AND MAINTAIN (altitude).

(3) Terminate radar monitoring when one of the following occurs:

(a) Visual separation is applied.

(b) The aircraft reports the approach lights or runway in sight.

(c) The aircraft is 1 mile or less from the runway threshold, if procedurally required and contained in facility directives.

(4) Do not inform the aircraft when radar monitoring is terminated.

(5) Do not apply the provisions of 5-180 for simultaneous ILS approaches.

i. When simultaneous ILS approaches are being conducted to parallel runways, consideration should be given to known factors that may in any way affect the safety of the instrument approach phase of flight, such as surface wind direction and velocity, wind shear alerts/reports, severe weather activity, etc. Closely monitor weather activity that could impact the final approach course. Weather conditions in the vicinity of the final approach course may dictate a change of approach in use.

5-127 thru 5-129 RESERVED

Section 10. RADAR APPROACHES — TERMINAL

5-130 APPLICATION

a. Provide radar approaches in accordance with standard or special instrument approach procedures.

b. A radar approach may be given to any aircraft upon request and may be offered to aircraft in distress regardless of weather conditions or to expedite traffic.

5-130b Note. — Acceptance of a radar approach by a pilot does not waive the prescribed weather minima for the airport or for the particular aircraft operator concerned. The pilot is responsible for determining if the approach and landing are authorized under the existing weather minima.

5-131 APPROACH INFORMATION

a. Issue the following information to an aircraft that will conduct a radar approach. Current approach information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS broadcast code. All items listed below, except for (3), may be omitted after the first approach if repeated approaches are made and no change has occurred.

5-131a Reference. — Approach Information by Approach Control Facilities, 4-72.

(1) Altimeter setting.

(2) Ceiling and visibility if ceiling at the airport of intended landing is reported below 1,000 feet, or below the highest circling minimum, whichever is greater, or if the visibility is less than 3 miles.

(3) Issue any known changes classified as special weather observations as soon as possible. Special weather observations need not be issued after they are included in the ATIS broadcast and the pilot states the appropriate ATIS broadcast code.

(4) Pertinent information on known airport conditions if they are considered necessary to the safe operation of the aircraft concerned.

(5) Lost communication procedures as specified in 5-133.

b. Before starting final approach:

5-131b Note. — ASR approach procedures may be prescribed for specific runways, an airport/heliport, a remote airport/heliport, and for helicopters only to a "point-in-space," i.e., a MAP from which a helicopter must be able to proceed to the landing area by visual reference to a prescribed surface route.

(1) Inform the aircraft of the type of approach, runway, airport, heliport, or other point, as appropriate, to which the approach will be made. Specify the airport name when the approach is to a secondary airport.

Phraseology:

THIS WILL BE A PAR/SURVEILLANCE APPROACH TO:

RUNWAY (runway number),

or

(airport name) AIRPORT, RUNWAY (runway number),

or

(airport name) AIRPORT/HELIPORT.

(2) For surveillance approaches, specify the location of the MAP in relation to the runway/airport/heliport.

Phraseology:

MISSED APPROACH POINT IS (distance) MILE/S FROM RUNWAY/AIRPORT/HELIPORT,

or, for a Point-In-Space Approach

A MISSED APPROACH POINT (distance) MILE/S (direction from landing area) OF (airport name) AIRPORT/HELIPORT.

5-131b(1) and (2) Example. — Helicopter Point-in-Space Approach:

"Army Copter Zulu Two, this will be a surveillance approach to a missed approach point, three point five miles south of Creedon Heliport."

5-131b Reference. — Elevation failure, 5-168.

c. Inform an aircraft making an approach to an airport not served by a tower that no traffic or landing runway information is available for that airport.

Phraseology:

NO TRAFFIC OR LANDING RUNWAY INFORMATION AVAILABLE FOR THE AIRPORT.

5-132 NO-GYRO APPROACH

When an aircraft will make a no-gyro surveillance or PAR approach:

a. Before issuing a vector, inform the aircraft of the type of approach.

Phraseology:

THIS WILL BE A NO-GYRO SURVEILLANCE/PAR APPROACH.

b. Instruct the aircraft when to start and stop turn.

Phraseology:

TURN LEFT/RIGHT.

STOP TURN.

c. After turn on to final approach has been made and prior to the aircraft reaching the approach gate, instruct the aircraft to make half-standard rate turns.

Phraseology:

MAKE HALF-STANDARD RATE TURNS.

5-133 LOST COMMUNICATIONS

USA/USAF/USN NOT APPLICABLE

When weather reports indicate that an aircraft will likely encounter IFR weather conditions during the approach, take the following action as soon as possible after establishing radar identification and radio communications (may be omitted after the first approach when successive approaches are made and the instructions remain the same):

5-133 Note. — Where a military air traffic control facility provides radar approach control services for a civil airport, civilian aircraft will be given specific lost communications procedures when lost communications instructions are required.

a. If lost communications instructions will require the aircraft to fly on an unpublished route, issue an appropriate altitude to the pilot. If the lost communications instructions are the same for both pattern and final, the pattern/vector controller shall issue both. Advise the pilot that if radio communications are lost for a specified time interval (not more than 1 minute) on vector to final approach, 15 seconds on a surveillance final approach, or 5 seconds on a PAR final approach to:

(1) Attempt contact on a secondary, or tower frequency.

(2) Proceed in accordance with visual flight rules, if possible.

(3) Proceed with an approved nonradar approach, or execute the specific lost communications procedure for the radar approach being used.

5-133a(3) Note. — The approved procedures are those published on the FAA Forms 8260 or applicable military document.

Phraseology:

IF NO TRANSMISSIONS ARE RECEIVED FOR (time interval) IN THE PATTERN OR FIVE/FIFTEEN SECONDS ON FINAL APPROACH, ATTEMPT CONTACT ON (frequency), AND

if possibility exists,

PROCEED VFR. IF UNABLE:

if approved,

PROCEED WITH (nonradar approach), MAINTAIN (altitude) UNTIL ESTABLISHED ON/OVER/FIX/NAVAID/APPROACH PROCEDURE,

or

(alternative instructions).

USN

Phraseology:

(For ACLS operations using Mode I, IA, and II). IF NO TRANSMISSIONS ARE RECEIVED FOR FIVE SECONDS AFTER LOSS OF DATA LINK, ATTEMPT CONTACT ON (frequency), AND

if possibility exists,

PROCEED VFR. IF UNABLE:

if approved,

PROCEED WITH (nonradar approach), MAINTAIN (altitude) UNTIL ESTABLISHED ON/OVER FIX/NAVAID/APPROACH PROCEDURE,

or

(alternative instructions).

b. If the final approach lost communications instructions are changed, differ from those for the pattern, or are not issued by the pattern controller, they shall be issued by the final controller.

c. If the pilot states that he cannot accept a lost communications procedure due to weather conditions or other reasons, request the pilot's intention.

5-133c Note. — The pilot is responsible for determining the adequacy of lost communications procedures with respect to aircraft performance, equipment capability, or reported weather.

5-134 RADAR CONTACT LOST

If radar contact is lost during an approach and the aircraft has not started final approach, clear the aircraft to an appropriate NAVAID/fix for an instrument approach.

5-135 LANDING CHECK

USA/USN

Advise the pilot to perform landing check while the aircraft is on downwind leg and in time to complete it before turning base leg. If an incomplete pattern is used, issue this before handoff to the final controller for a PAR approach, or before starting descent on final approach for surveillance approach.

Phraseology:

PERFORM LANDING CHECK

5-136 POSITION INFORMATION

Inform the aircraft of its position at least once before starting final approach.

Phraseology:

(Number) MILES (direction) OF AIRPORT,

or

DOWNWIND/BASE LEG (number) MILES (direction) OF AIRPORT.

5-137 FINAL CONTROLLER CHANGEOVER

When instructing the aircraft to change frequency for final approach guidance, include the name of the facility.

Phraseology:

CONTACT (name of facility) FINAL CONTROLLER ON (frequency).

5-138 COMMUNICATIONS CHECK

On initial contact with the final controller, ask the aircraft for a communication check.

Phraseology:

(Aircraft call sign), (name of facility) FINAL CONTROLLER.

HOW DO YOU HEAR ME?

5-139 TRANSMISSION ACKNOWLEDGMENT

After contact has been established with the final controller and while on the final approach course, instruct the aircraft not to acknowledge further transmissions.

Phraseology:

DO NOT ACKNOWLEDGE FURTHER TRANSMISSIONS.

5-140 WHEELS DOWN CHECK

USA/USAF/USN

Before the aircraft starts descent on final approach, remind the pilot that wheels should be down unless he has previously reported wheels down.

Phraseology:

WHEELS SHOULD BE DOWN.

5-140 Note. — The intent is solely to remind the pilot to lower the wheels; not to place responsibility on the controller.

5-141 MISSED APPROACH

USAF NOT APPLICABLE

Before an aircraft starts final descent for a full stop landing and weather reports indicate that any portion of the final approach will be conducted in IFR conditions, issue a specific missed approach procedure approved for the radar approach being conducted.

Phraseology:

YOUR MISSED APPROACH PROCEDURE IS (missed approach procedure).

5-141 Note. — The specific missed approach procedure is published on FAA Form 8260-4 or applicable military document.

5-142 LOW APPROACH AND TOUCH-AND-GO

Before an aircraft which plans to execute a low approach or touch-and-go begins final descent, issue appropriate departure instructions to be followed upon completion of the approach. Climb-out instructions must include a specific heading and altitude except when the aircraft will maintain VFR and contact the tower.

Phraseology:

AFTER COMPLETING LOW APPROACH/

TOUCH AND GO:

CLIMB AND MAINTAIN (altitude).

TURN (right or left) HEADING (degrees)/FLY RUNWAY HEADING,

or

MAINTAIN VFR, CONTACT TOWER,

or

(other instructions as appropriate).

5-142 Note. — This may be omitted after the first approach if instructions remain the same.

5-143 TOWER CLEARANCE

a. When an aircraft is on final approach to an airport served by a tower, obtain a clearance to land, touch-and-go, or make low approach. Issue the clearance and the surface wind to the aircraft.

b. If the clearance is not obtained or is cancelled, inform the aircraft and issue alternative instructions.

Phraseology:

TOWER CLEARANCE CANCELLED/NOT RECEIVED (alternative instructions).

5-144 FINAL APPROACH ABNORMALITIES

Instruct the aircraft if runway environment not in sight, execute a missed approach if previously given; or climb to or maintain a specified altitude and fly a specified course whenever the completion of a safe approach is questionable because one or more of the following conditions exists. The conditions in a., b., and c., below do not apply after the aircraft passes decision height on a PAR approach.

5-144 Examples —

Examples of reasons for issuing missed approach instructions:

"Radar contact lost."

"Too high/low for safe approach."

"Too far right/left for safe approach."

5-144 Reference. — Position Advisories, 5-168.

a. Safety limits are exceeded or radical target deviations are observed.

b. Position or identification of the aircraft is in doubt.

c. Radar contact is lost or a malfunctioning radar is suspected.

Phraseology:

(Reason) IF RUNWAY/APPROACH LIGHTS/ RUNWAY LIGHTS NOT IN SIGHT, EXECUTE MISSED APPROACH/(alternative instructions).

5-144c Note. — If the pilot requests, approval may be granted to proceed with the approach via ILS or other navigational aid.

5-144c Reference. — Radar Contact Lost, 5-134.

d. Airport conditions or traffic preclude approach completion.

Phraseology:

EXECUTE MISSED APPROACH/(alternative instructions). (Reason).

5-145 thru 5-149 RESERVED

Section 11. SURVEILLANCE APPROACHES — TERMINAL

5-150 ALTITUDE INFORMATION

Provide recommended altitudes on final approach if the pilot requests. If recommended altitudes are requested, inform the pilot that recommended altitudes which are at or above the published MDA will be given for each mile on final.

5-150 Reference. — Facility managers refer to Order 7210.3 — 1246, Recommended Altitudes for Surveillance Approaches.

5-151 VISUAL REFERENCE REPORT

Aircraft may be requested to report the runway, approach/runway lights, or airport in sight. Helicopters making a "point-in-space" approach may be requested to report when able to proceed to the landing area by visual reference to a prescribed surface route.

Phraseology:

REPORT (runway, approach/runway lights or airport) IN SIGHT.

REPORT WHEN ABLE TO PROCEED VISUALLY TO AIRPORT/HELIPORT.

5-152 DESCENT NOTIFICATION

a. Issue advance notice of where descent will begin and issue the straight-in MDA prior to issuing final descent for the approaches.

5-152a Note. — The point at which descent to the minimum descent altitude is authorized is the final approach fix unless an altitude limiting stepdown-fix is prescribed.

b. When it is determined that the surveillance approach will terminate in a circle to land maneuver, request the aircraft approach category from the pilot. After receiving the aircraft approach category, provide him with the applicable circling MDA prior to issuing final descent for the approach.

5-152b Note. — Pilots are normally expected to furnish the aircraft approach category to the controller when it is determined that the surveillance approach will terminate in a circle to land maneuver. If this information is not voluntarily given, solicit the aircraft approach category from the pilot and then issue him the applicable circling MDA.

Phraseology:

PREPARE TO DESCEND IN (number) MILE/S.

For straight-in approaches

PUBLISHED MINIMUM DESCENT ALTITUDE (altitude).

For circling Approaches

REQUEST YOUR AIRCRAFT APPROACH CATEGORY. (Upon receipt of aircraft approach category), PUBLISHED CIRCLING MINIMUM DESCENT ALTITUDE (altitude).

5-153 DESCENT INSTRUCTIONS

When an aircraft reaches the descent point, issue one of the following, as appropriate:

5-153 Reference. — Elevation Failure, 5-168.

a. Unless a descent restriction exists, advise the aircraft to descend to the MDA.

Phraseology:

(Number) MILES FROM RUNWAY/AIRPORT/HELIPORT. DESCEND TO YOUR MINIMUM DESCENT ALTITUDE.

b. When a descent restriction exists, specify the prescribed restriction altitude. When the aircraft has passed the altitude limiting point, advise to continue descent to MDA.

Phraseology:

(Number) MILES FROM RUNWAY/AIRPORT/HELIPORT. DESCEND AND MAINTAIN (restriction altitude).

DESCEND TO YOUR MINIMUM DESCENT ALTITUDE.

5-154 FINAL APPROACH GUIDANCE

a. Issue course guidance, inform the aircraft when it is on-course, and frequently inform the aircraft of any deviation from course.

Phraseology:

HEADING (heading),

ON-COURSE,

or

SLIGHTLY/WELL LEFT/RIGHT OF COURSE.

5-154a Note. — Controllers should not key the radio transmitter continuously during radar approaches to preclude a lengthy communications block. The decision on how often transmitters are unkeyed is the controller's prerogative.

b. Issue trend information, as required, to indicate target position with respect to the extended runway centerline and to describe the target movement as appropriate corrections are issued. Trend information may be modified by the terms "RAPIDLY" AND "SLOWLY", as appropriate.

5-154b Examples. —

"Going left/right of course." "Left/right of course and holding/correcting."

c. Inform the aircraft of its distance from the runway, airport/heliport or MAP, as appropriate, each mile on final.

Phraseology:

(Number) MILE/S FROM RUNWAY/AIRPORT/ HELIPORT OR MISSED APPROACH POINT.

d. Recommended altitudes shall be furnished, if requested, in accordance with 5-150.

Phraseology:

If requested,

ALTITUDE SHOULD BE (altitude).

5-155 APPROACH GUIDANCE TERMINATION

a. Discontinue surveillance approach guidance when:

(1) Requested by the pilot.

(2) In your opinion, continuation of a safe approach to the MAP is questionable.

(3) The aircraft is over the MAP.

b. *USAF NOT APPLICABLE.* Surveillance approach guidance may be discontinued when the pilot reports the runway or approach/runway lights in sight or if a "point-in-space" approach, he reports able to proceed to the landing area by visual reference to a prescribed surface route.

c. When approach guidance is discontinued in accordance with a. above and the aircraft has reported the runway or approach/runway lights in sight, advise the aircraft of its position and to proceed visually.

Phraseology:

(Distance) MILE/S FROM RUNWAY/AIRPORT/ HELIPORT

or

OVER MISSED APPROACH POINT.

PROCEED VISUALLY (additional instructions/ clearance as required).

d. When approach guidance is discontinued in accordance with a. above and the aircraft has not reported the runway or approach/runway lights in sight, advise the aircraft of its position and to execute a missed approach unless the runway or approach/runway lights are in sight or, if a "point-in-space" approach, unless able to proceed visually.

Phraseology:

(Distance) MILE/S FROM RUNWAY,

or

OVER MISSED APPROACH POINT.

IF RUNWAY,

or

APPROACH/RUNWAY LIGHTS NOT IN SIGHT, EXECUTE MISSED APPROACH/(missed approach instructions). (Additional instructions/ clearance, as required).

(Distance and direction) FROM AIRPORT/HELIPORT/MISSED APPROACH POINT.

IF UNABLE TO PROCEED VISUALLY, EXECUTE MISSED APPROACH. (Additional instructions/clearance, if required).

5-155d Note. — Terminal Instrument Approach Procedures and Flight Inspection criteria require establishment of a MAP for each procedure including the point to which satisfactory radar guidance can be provided.

5-156 thru 5-159 RESERVED

Section 12. PAR APPROACHES — TERMINAL

5-160 GLIDEPATH NOTIFICATION

Inform the aircraft when it is approaching glidepath (approximately 10 to 30 seconds before final descent).

Phraseology:

APPROACHING GLIDEPATH.

5-161 DECISION HEIGHT (DH) NOTIFICATION

Provide the DH to any pilot who requests it.

Phraseology:

PUBLISHED DECISION HEIGHT (number of feet).

5-162 DESCENT INSTRUCTION

When an aircraft reaches the point where final descent is to start, instruct it to begin descent.

Phraseology:

BEGIN DESCENT.

5-163 GLIDEPATH AND COURSE INFORMATION

a. Issue course guidance and inform the aircraft when it is on glidepath and on course, and frequently inform the aircraft of any deviation from glidepath or course.

Phraseology:

HEADING (heading).

ON GLIDEPATH.

ON COURSE,

or

SLIGHTLY/WELL ABOVE/BELOW GLIDEPATH.

SLIGHTLY/WELL LEFT/RIGHT OF COURSE.

5-163a Note. — Controllers should not key the radio transmitter continuously during radar approaches to preclude a lengthy communications block. The decision on how often transmitters are unkeyed is the controller's prerogative.

b. Issue trend information as required, to indicate target position with respect to the azimuth and elevation cursors and to describe target movement as appropriate corrections are issued. Trend information may be modified by the terms "RAPIDLY or "SLOWLY", as appropriate.

5-163b Examples. —

"Going above/below glidepath."

"Going right/left of course."

"Above/below glidepath and coming down/up."

"Above/below glidepath and holding."

"Left/right of course and holding/correcting."

5-164 DISTANCE FROM TOUCHDOWN

Inform the aircraft of its distance from touchdown at least once each mile on final approach.

Phraseology:

(Number of miles) MILES FROM TOUCHDOWN.

5-165 DECISION HEIGHT

Inform the aircraft when it reaches the published decision height.

Phraseology:

AT DECISION HEIGHT.

5-166 POSITION ADVISORIES

a. Continue to provide glidepath and course information prescribed in 5-163a. and b. until the aircraft passes over threshold.

5-166 Note. — Glidepath and course information provided below decision height is advisory only. FAR 91.117 outlines pilot responsibilities for descent below decision height.

b. Inform the aircraft when it is passing over the approach lights.

Phraseology:

OVER APPROACH LIGHTS.

c. Inform the aircraft when it is passing over the landing threshold and inform it of its position with respect to the final approach course.

Phraseology:

OVER LANDING THRESHOLD, (position with respect to course).

5-167 COMMUNICATION TRANSFER

Issue communications transfer instructions.

Phraseology:

CONTACT (terminal control function) (frequency, if required) AFTER LANDING.

5-167 Note. — Communications transfer instructions should be delayed slightly until the aircraft is on the landing roll-out to preclude diversion of the pilot's attention during transition and touchdown.

5-167 Reference. — Radio Communications Transfer, 2-17.

5-168 ELEVATION FAILURE

a. If the elevation portion of PAR equipment fails during a precision approach:

(1) Discontinue PAR instructions and tell the aircraft to take over visually or, if unable, to execute a missed approach. If the aircraft executes a missed approach, apply (2) below.

Phraseology:

NO GLIDEPATH INFORMATION AVAILABLE. IF RUNWAY, APPROACH/RUNWAY LIGHTS NOT IN SIGHT, EXECUTE MISSED APPROACH/(alternative instructions).

(2) If a surveillance approach, ASR or PAR without glide slope, is established for the same runway, inform the aircraft that a surveillance approach can be given. Use ASR or the azimuth portion of the PAR to conduct the approach and apply Section 11 of this chapter. When the PAR azimuth is used, inform the pilot that mileage information will be from touchdown and at those runways where specific minima have been established for PAR without glide slope. Inform the pilot that the PAR azimuth will be used for the approach.

5-168a(2) Examples. —

a. Approach information when PAR azimuth used:

"This will be a surveillance approach to Runway Three Six. Mileages will be from touchdown," or

"This will be a surveillance approach to Runway Three Six using PAR azimuth. Mileages will be from touchdown."

b. Descent instructions:

"Five miles from touchdown, descend to your minimum descent altitude/minimum altitude."

5-168a(2) Reference. — Approach Information 5-131; Descent Instructions, 5-153.

b. If the elevation portion of the PAR equipment is inoperative before starting a precision approach, apply a. (2) above.

5-169 SURVEILLANCE UNUSABLE

PAR approaches may be conducted when the ASR is unusable provided a nonradar instrument approach will position the aircraft over a navigational aid or DME fix within the precision radar coverage, or an adjacent radar facility can provide a direct radar handoff to the PAR controller.

5-169 Note. — The display of the NAVAID or DME fix in accordance with 5-51b. is not required provided the NAVAID or DME fix can be correlated on a PAR scope.

5-170 thru 5-179 RESERVED

Section 13. USE OF PAR FOR APPROACH MONITORING — TERMINAL

5-180 MONITOR ON PAR EQUIPMENT

Aircraft conducting precision or nonprecision approaches shall be monitored by PAR equipment if the PAR final approach course coincides with the NAVAID final approach course from the final approach fix to the runway and one of the following conditions exists:

5-180 Note 1. — The provisions of this Section do not apply to monitoring simultaneous ILS Approaches.

5-180 Note 2. — This procedure is used in PAR facilities operated by the FAA and the military services at joint-use civil/military locations and military installations during the operational hours of the PAR.

a. The reported weather is below basic VFR minima. *(USAF:* When reported weather is below 1,500 feet or 3 miles.)

b. *USA NOT APPLICABLE.* At night.

c. Upon request of the pilot.

5-181 MONITOR AVAILABILITY

a. Inform the aircraft of the frequency on which monitoring information will be transmitted if it will not be the same as the communication frequency used for the approach.

Phraseology:

RADAR MONITORING ON LOCALIZER VOICE (frequency),

and, if applicable

CONTACT (terminal control function) (frequency, if required) AFTER LANDING.

b. If the approach is not monitored, inform the aircraft that radar monitoring is not available.

Phraseology:

RADAR MONITORING NOT AVAILABLE.

c. If conditions prevent continued monitor after the aircraft is on final approach, advise the pilot. State the reason and issue alternate procedures as appropriate.

Phraseology:

(Reason), RADAR MONITORING NOT AVAILABLE, (alternative instructions).

5-181c Note. — Approach monitoring is a vital service, but during the approach, the controller acts primarily as a safety observer and does not actually guide the aircraft. Loss of the radar monitoring capability (and thus availability) is no reason to terminate an otherwise good instrument approach. Advise the pilot that radar contact has been lost (or other reason as appropriate), that radar monitoring is not available, and of actions for the pilot to take in either proceeding with or breaking off the approach; i.e., contact tower, remain on PAR frequency, etc.

5-182 MONITOR INFORMATION

When approaches are monitored, take the following action:

a. Advise the pilot executing a nonprecision approach that glidepath advisories are not provided. Do this prior to the pilot beginning his final descent.

Phraseology:

GLIDEPATH ADVISORIES WILL NOT BE PROVIDED.

b. Inform the aircraft when passing final approach fix.

Phraseology:

PASSING (fix).

c. Advise the pilot of glidepath trend information (precision approaches) and course trend information to indicate target position and movement with respect to the elevation or azimuth cursor when the aircraft target corresponds to a position of well above/below the glidepath or well left/right of course and whenever the aircraft exceeds the radar safety limits. Repeat if no correction is observed.

5-182c Examples. —

Course trend information: "(Ident), well right/left of PAR course, drifting further right/left."

Glidepath trend information: "(Ident), well above/below PAR glidepath."

5-182c Reference. — Glidepath and Course Information, 5-163b.

d. If, after repeated advisories, the aircraft is observed proceeding outside the safety limits or a radical target deviation is observed, advise the aircraft if unable to proceed visually, execute a missed approach. Issue a specific altitude and heading if a procedure other than the published missed approach is to be executed.

Phraseology:

(Position with respect to course or glidepath). IF NOT VISUAL, ADVISE YOU EXECUTE MISSED APPROACH (alternative instructions).

e. Provide monitor information until the aircraft is over the landing threshold or commences a circling approach.

5-183 WHEELS DOWN CHECK

USA/USAF/USN

Before the aircraft starts descent on final approach, remind the pilot that wheels should be down unless he has previously reported wheels down.

Phraseology:
WHEELS SHOULD BE DOWN.

5-183 Note. — The intent is solely to remind the pilot to lower the wheels; not to place responsibility on the controller.

5-184 thru 5-189 RESERVED

Section 14. AUTOMATION — EN ROUTE

5-190 CONFLICT ALERT

a. When a conflict alert is displayed, evaluate the reason for the alert without delay and take appropriate action.

5-190a Reference. — Safety Advisory, 2-6.

b. If another controller is involved in the alert, initiate coordination to ensure an effective course of action. Coordination is not required when immediate action is dictated.

c. Suppressing/Inhibiting Conflict Alert.

(1) The controller may suppress the display of a Conflict Alert from a control position with the application of one of the following suppress/inhibit computer functions:

(a) The Conflict Suppress (CO) function may be used to suppress the CA display between specific aircraft for a specific alert.

(b) The Group Suppression (GS) function shall be applied exclusively to inhibit the displaying of alerts among military aircraft engaged in special military operations where standard en route separation criteria do not apply.

5-190c(1) Note. — Special military operations where the GS function would typically apply involve those activities where military aircraft routinely operate in proximities to each other that are less than standard en route separation criteria (i.e., air refueling operations, ADC practice intercept operations.)

(2) Computer entry of a message suppressing a Conflict Alert constitutes acknowledgment for the alert and signifies that appropriate action has or will be taken.

(3) Conflict Alert may not be suppressed or inhibited at or for another control position without being coordinated.

5-191 EN ROUTE MINIMUM SAFE ALTITUDE WARNING (E-MSAW)

a. When an E-MSAW alert is displayed, immediately analyze the situation and, if necessary, take the appropriate action to resolve the alert.

5-191a Note. — Caution should be exercised when issuing a clearance to an aircraft in reaction to an E-MSAW alert to ensure that adjacent MIA areas are not a factor.

5-191a Reference. — Safety Advisory, 2-6.

b. The controller may suppress the display of an E-MSAW alert from his control position with the application of one of the following suppress/inhibit computer functions:

(1) The Specific Alert Suppression message may be used to inhibit the E-MSAW alerting display on a single flight for a specific alert.

(2) The Indefinite Alert Suppression message shall be used exclusively to inhibit the display of E-MSAW alerts on aircraft known to be flying at an altitude that will activate the alert feature of one or more MIA areas within an ARTCC.

5-191b(2) Note 1. — The Indefinite Suppression message will remain in effect for the duration of the referenced flight's active status within the ARTCC unless modified by controller action.

5-191b(2) Note 2. — The Indefinite Suppression message would typically apply to military flights with clearance to fly low-level type routes that routinely require altitudes below established minimum IFR altitudes.

c. Computer entry of a message suppressing or inhibiting E-MSAW alerts constitutes acknowledgment for the alert and indicates that appropriate action has or will be taken to resolve the situation.

5-192 COMPUTER ENTRY OF ASSIGNED ALTITUDE

The data block shall always reflect the current status of the aircraft, unless otherwise specified in a facility directive. Whenever an aircraft is cleared to maintain an altitude different from that in the flight plan data base, enter into the computer one of the following:

5-192 Note. — A facility directive may be published deleting the interim altitude computer entry requirements of 5-192b. The directive would apply to those conditions where heavy traffic or sector complexity preclude meeting these entry requirements.

5-192 Reference. — Order 7210.3-1025, Waiver of Interim Altitude Requirements.

a. The new assigned altitude if the aircraft will (climb or descend to and) maintain the new altitude, or

b. An interim altitude if the aircraft will (climb or descend to and) maintain the new altitude for a short period of time and subsequently be recleared to the altitude in the flight plan data base or a new altitude or a new interim altitude.

5-192b Note. — Use of the interim altitude function will ensure that the data block reflects the actual status of the aircraft and eliminate superfluous altitude updates.

5-193 ENTRY OF REPORTED ALTITUDE

Except in EARTS, whenever Mode C altitude information is either not available or is unreliable, enter reported altitudes into the computer as follows:

5-193 Note. — Altitude updates are required to assure maximum accuracy in applying slant range correction formulas.

a. When an aircraft reaches the assigned altitude.

b. When an aircraft at an assigned altitude is issued a clearance to climb or descend.

c. A minimum of each 10,000 feet during climb to or descent from FL 180 and above.

5-194 SELECTED ALTITUDE LIMITS

To ensure the display of Mode C targets and data blocks, take the following actions:

5-194 Note. — Exception to these requirements may be authorized for specific altitudes in certain center sectors if defined in appropriate facility directives and approved by the Regional AT Division Manager.

a. NAS En Route Stage A:

(1) Display altitude limits in the "R" CRD to include, as a minimum, the altitude stratum of the sector, and

(2) Select the display filter keys on the PVD that include, as a minimum, the altitude stratum of the sector plus:

(a) 1,200 feet above the highest and below the lowest altitude or flight level of the sector where 1,000 feet vertical separation is applicable, and

(b) 2,200 feet above the highest and below the lowest flight level of the sector where, 2,000 feet vertical separation is applicable.

b. En Route Automated Radar Tracking System (EARTS). Select altitude filter limits to include, as a minimum, the altitude stratum of the sector display.

c. Direct Access Radar Channel (DARC):

(1) Display altitude limits on the PVD to include, as a minimum, the altitude stratum of the sector, and

(2) Select the display filter keys on the PVD that include, as a minimum, the altitude stratum of the sector plus:

(a) 1,200 feet above the highest and below the lowest altitude or flight level of the sector where 1,000 feet vertical separation is applicable, and

(b) 2,200 feet above the highest and below the lowest flight level of the sector where 2,000 feet vertical separation is applicable.

5-195 SECTOR ELIGIBILITY

The use of the OK function is allowed to override sector eligibility only when one of the following conditions is met:

a. Prior coordination is effected.

b. The flight is within the control jurisdiction of the sector.

5-196 COAST TRACKS

Do not use coast tracks in the application of either radar or nonradar separation criteria.

5-197 CONTROLLER INITIATED COAST TRACKS

a. Initiate coast tracks only in Flight Plan Aided Tracking (FLAT) mode, except "free" coast tracking may be used as a reminder that aircraft without corresponding computer stored flight plan information are under your control.

5-197a Note. — To ensure tracks are started in FLAT mode, perform a start track function at the aircraft's most current reported position, then immediately "force" the track into coast tracking by performing another start function with "CT" option in field 64. Making amendments to the stored route with trackball entry when the aircraft is rerouted, and repositioning the data block to coincide with the aircraft's position reports are methods of maintaining a coast track in FLAT mode.

b. Prior to initiating a coast track, ensure the following:

(1) A departure message or progress report corresponding with aircraft's current position is entered into the computer.

(2) The track being started is within Posted Time Update Interval (PTUI) of the aircraft's computer-estimated position and Flight Plan Track Position Difference (FTPD) distance of the aircraft's flight plan route.

5-197b(2) Note. — FTPD is an automation parameter, normally set to 15 miles, that is compared with the tracked target's perpendicular distance from the stored flight plan route. If the track is within the parameter miles, it is eligible for "FLAT Tracking." PTUI is an automation parameter, normally set to 3 minutes, that is compared against the difference between the calculated time of arrival and the actual time of arrival over a fix. If the difference is greater than PTUI, the flight plan's stored data will be revised and fix-time update messages will be generated.

c. As soon as practicable after the aircraft is in radar surveillance, initiate action to cause radar tracking to begin on the aircraft.

5-198 thru 5-209 RESERVED

Section 15. AUTOMATED RADAR TERMINAL SYSTEMS (ARTS) — TERMINAL

5-210 APPLICATION

ARTS may be used for identifying aircraft assigned a discrete beacon code, maintaining identity of targets, and performing handoffs of these targets between controllers.

5-210 Note. — *USAF:* Where PIDP equipment is capable of performing the functions described in this section, it may be used accordingly.

5-211 RESPONSIBILITY

This equipment does not relieve the controller of the responsibility to ensure proper identification, maintenance of identity, handoff of the correct target associated with the alphanumeric data, and separation of aircraft.

5-212 FUNCTIONAL USE

In addition to other uses specified herein, terminal automation may be used for the following functions:

a. Tracking (ARTS III and IIIA).

b. Tagging (ARTS II).

c. Handoff (ARTS II, III, and IIIA).

d. Altitude information (ARTS II, III, and IIIA).

e. Coordination (ARTS II, III, and IIIA).

f. Ground speed (ARTS III and IIIA).

g. Identification.

5-213 SYSTEM REQUIREMENTS

Use the ARTS systems as follows:

5-213 Note. — Locally developed procedures, operating instructions, and training material are required because of differences in equipment capability. Such locally developed procedures shall be supplemental to those contained in this section and shall be designed to make maximum use of the ARTS equipment.

a. Inform all appropriate positions before terminating or reinstating use of the ARTS system at a control position. When terminating the use of ARTS, all pertinent flight data of that position shall be transferred or terminated.

b. Inform other interfaced facilities of scheduled and unscheduled shutdowns.

c. Initiate a track/tag on all aircraft to the maximum extent possible. As a minimum, aircraft identification should be entered and automated handoff functions should be used.

d. Assigned altitude, if displayed, shall be kept current at all times. Climb and descent arrows, where available, shall be used to indicate other than level flight.

e. Do not use the automatic altitude readout of an aircraft under another controller's jurisdiction for vertical separation purposes without verbal coordination.

5-214 INFORMATION DISPLAYED

a. Two-letter ICAO designators or three letter designators, as appropriate, shall be used unless program limitations dictate the use of a single letter alpha prefix.

b. Use of the inhibit select switches to remove displayed information no longer required shall be in accordance with local directives which should ensure maximum required use of the equipment.

c. Information displayed in the ATIS, General Information, and Scratch Pad areas shall be in accordance with local directives.

5-215 CONFLICT ALERT

a. When a conflict alert is displayed, evaluate the reason for the alert without delay and take appropriate action.

5-215a Reference. — Safety Advisory, 2-6.

b. If another controller is involved in the alert, initiate coordination to ensure an effective course of action. Coordination is not required when immediate action is dictated.

c. Suppressing/Inhibiting Conflict Alert.

(1) The suppress function may be used to suppress the display of a specific Conflict Alert.

(2) The inhibit function shall only be used to inhibit the display of Conflict Alert for aircraft routinely engaged in operations where standard separation criteria do not apply.

5-215c(2)(b) Note. — Examples of operations where standard separation criteria do not apply are ADC practice intercept operations and air shows.

(3) Computer entry of a message suppressing a Conflict Alert constitutes acknowledgment for the alert and signifies that appropriate action has or will be taken.

(4) Conflict Alert may not be suppressed or inhibited at or for another control position without being coordinated.

5-216 INHIBITING MINIMUM SAFE ALTITUDE WARNING (MSAW)

a. Assign a beacon code to VFR aircraft to inhibit MSAW processing unless the aircraft has specifically requested MSAW. Inhibit MSAW processing for an aircraft which has cancelled its IFR

flight plan but has not requested MSAW processing.

b. A low altitude alert may be suppressed from the control position. Computer entry of the suppress message constitutes an acknowledgment for the alert and indicates that appropriate action has or will be taken.

5-217 TRACK SUSPEND FUNCTION

Use the track suspend function only when data block overlap in holding patterns or in proximity of the final approach create an unworkable situation. If necessary to suspend tracks, those which are not displaying automatic altitude readouts shall be suspended. If the condition still exists, those displaying automatic altitude readouts may then be suspended.

5-218 thru 5-219 RESERVED

Section 16. TPX-42 — TERMINAL

5-220 APPLICATION

Each TPX-42 facility shall utilize the equipment to the maximum extent possible consistent with local operating conditions.

5-221 RESPONSIBILITY

This equipment does not relieve the controller of the responsibility to ensure proper identification, maintenance of identity, hand-off of the correct radar beacon target associated with numeric data, and the separation of aircraft.

5-222 FUNCTIONAL USE

TPX-42 may be used for the following functions:

a. Tagging.

b. Altitude information.

c. Coordination.

d. Target identity confirmation.

5-223 SYSTEM REQUIREMENTS

Use the TPX-42 system as follows:

a. TPX-42 facilities shall inform adjacent facilities of scheduled and unscheduled shutdowns.

b. To the maximum extent practicable, tags should be utilized for all controlled aircraft.

5-224 INFORMATION DISPLAYED

a. Inhibiting portions of the tag shall be in accordance with facility directives which shall ensure maximum required use of the equipment.

b. Mode C altitude information shall not be inhibited unless a ground malfunction causes repeated discrepancies of 300 feet or more between the automatic altitude readouts and pilot reported altitudes.

5-225 ALTITUDE FILTERS

Set altitude filters to display Mode C within each controller's area of responsibility by setting the altitude limits to encompass all altitudes under the controller's jurisdiction. Set upper limits no lower than 1,000 feet above the highest altitude for which the controller is responsible. Lower limits normally should encompass field elevation so that provisions of 2-6 and 5-37b.(3) may be applied. Air traffic managers may authorize temporary suspension of this requirement when clutter is excessive.

5-226 INHIBITING LOW ALTITUDE ALERT SYSTEM (LAAS)

Assign a beacon code to a VFR aircraft or to an aircraft that has canceled its IFR flight plan to inhibit LAAS processing unless the aircraft has specifically requested LAAS.

TABLE OF CONTENTS

Page

Chapter 6. NON-RADAR

Section 1. GENERAL

6-1 DME 6-1
6-2 Nonreceipt of Position Report 6-1
6-3 Duplicate Position Reports 6-1
6-4 Adjacent Airport Operation 6-1
6-5 Arrival Minima 6-1
6-6—6-9 Reserved 6-1

Section 2. INITIAL SEPARATION OF SUCCESSIVE DEPARTING AIRCRAFT

6-10 Minima on Diverging Courses 6-2
6-11 Minima on Same Course 6-3
6-12—6-19 Reserved 6-3

Section 3. INITIAL SEPARATION OF DEPARTING AND ARRIVING AIRCRAFT

6-20 Separation Minima 6-4
6-21—6-29 Reserved 6-4

Section 4. LONGITUDINAL SEPARATION

6-30 Application 6-5
6-31 Minima on Same, Converging, or Crossing Courses 6-5
6-32 Minima on Opposite Courses 6-7
6-33 Separation by Pilots 6-8
6-34 RNAV Aircraft Along VOR Airways/Routes 6-8
6-35—6-39 Reserved 6-8

Section 5. LATERAL SEPARATION

6-40 Separation Methods 6-9
6-41 Minima on Diverging Radials 6-9
6-42 DME Arc Minima 6-9
6-43 Minima Along Other Than Established Airways or Routes 6-10
6-44 RNAV Minima — Diverging/Crossing Courses 6-11
6-45—6-49 Reserved 6-11

Section 6. VERTICAL SEPARATION

6-50 Application 6-12
6-51 Minima Between Altitudes 6-12
6-52 Exceptions 6-12
6-53 Separation by Pilots 6-12
6-54—6-59 Reserved 6-12

Section 6. TIMED APPROACHES

6-60 Application 6-13
6-61 Approach Sequence 6-13
6-62 Sequence Interruption 6-14
6-63 Level Flight Restriction 6-14
6-64 Interval Minima 6-14
6-65 Time Check 6-14
6-66 Missed Approaches 6-14

Chapter 6. NON-RADAR

Section 1. GENERAL

6-1 DME

Use DME procedures and minima only when direct pilot-controller communications are maintained.

6-2 NONRECEIPT OF POSITION REPORT

When a position report affecting separation is not received, take action to obtain the report no later than 5 minutes after the aircraft was estimated over the fix.

6-3 DUPLICATE POSITION REPORTS

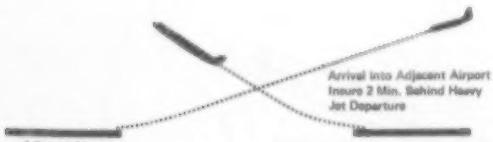
Do not require an aircraft to make the same position report to more than one facility.

6-4 ADJACENT AIRPORT OPERATION

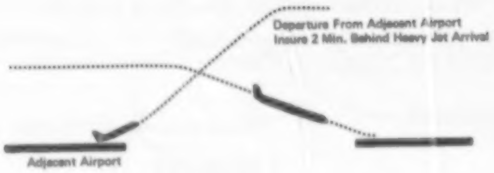
TERMINAL

WAKE TURBULENCE APPLICATION

The ATC facility providing service to heavy jets and having control jurisdiction at adjacent airports shall separate arriving or departing IFR aircraft on a course that will cross behind the flight path of a heavy jet — *2 minutes.*


Arrival into Adjacent Airport
Insure 2 Min. Behind Heavy
Jet Departure
Adjacent Airport

6-4 Illustration 1


Departure From Adjacent Airport
Insure 2 Min. Behind Heavy Jet Arrival
Adjacent Airport

6-4 Illustration 2

6-5 ARRIVAL MINIMA

TERMINAL

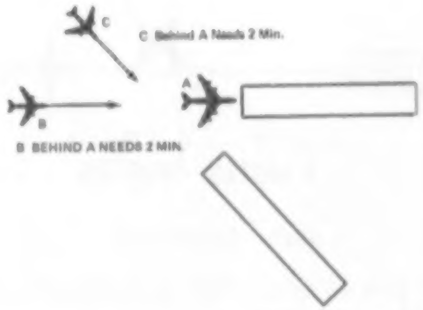
WAKE TURBULENCE APPLICATION

Separate IFR aircraft landing behind an arriving heavy jet by *2 minutes* when arriving:

a. The same runway (use *3 minutes* for a small aircraft behind a heavy jet).

b. A parallel runway separated by less than 2,500 feet.

c. A crossing runway if projected flight paths will cross.


C
C Behind A Needs 2 Min.
A
B
B BEHIND A NEEDS 2 MIN

6-5a&c Illustration

6-6 thru 6-9 RESERVED

Section 2. INITIAL SEPARATION OF SUCCESSIVE DEPARTING AIRCRAFT

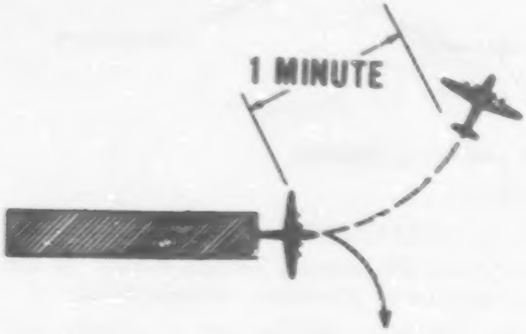
6-10 MINIMA ON DIVERGING COURSES

Separate aircraft that will fly courses diverging by 45 degrees or more after departing the same or adjacent airports by use of one of the following minima:

6-10 Note. — Consider known aircraft performance characteristics when applying initial separation to successive departing aircraft.

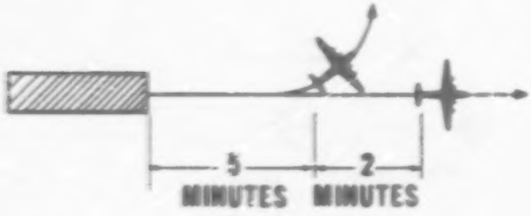
a. When aircraft will fly diverging courses:

(1) Immediately after takeoff — *1 minute* until courses diverge.



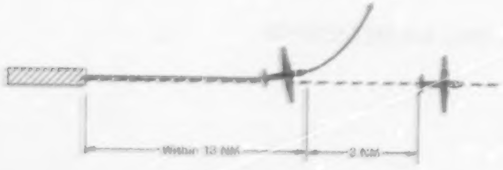
6-10a(1) Illustration

(2) Within 5 minutes after takeoff — *2 minutes* until courses diverge.



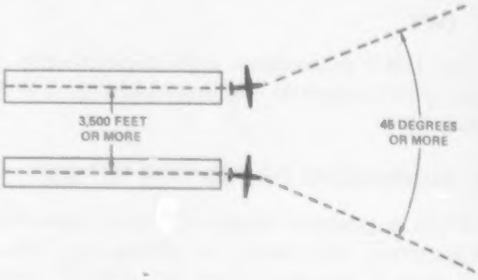
6-10a(2) Illustration

(3) Within 13 miles DME after takeoff — *3 miles* until courses diverge.



6-10a(3) Illustration

b. *TERMINAL:* Between aircraft departing in the same direction from different runways whose centerlines are parallel and separated by at least 3,500 feet — Authorize simultaneous takeoffs when the aircraft will fly diverging courses immediately after takeoff.



6-10b Illustration

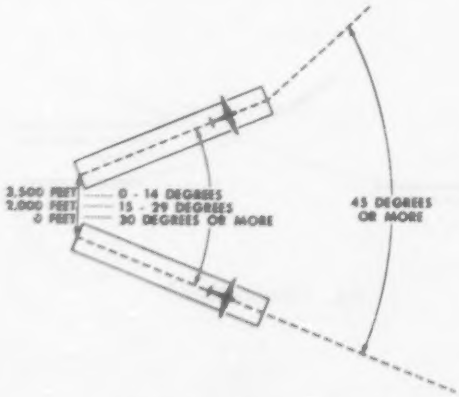
c. *TERMINAL:* Between aircraft that will fly diverging courses immediately after takeoff from diverging runways:

(1) Nonintersecting runways — Authorize simultaneous takeoffs when either of the following conditions exist:

(a) The runways diverge by 30 degrees or more.

(b) The distance between runway centerlines at and beyond the points where takeoffs begin is at least:

(i) 2,000 feet and the runways diverge by 15 to 29 degrees inclusive.

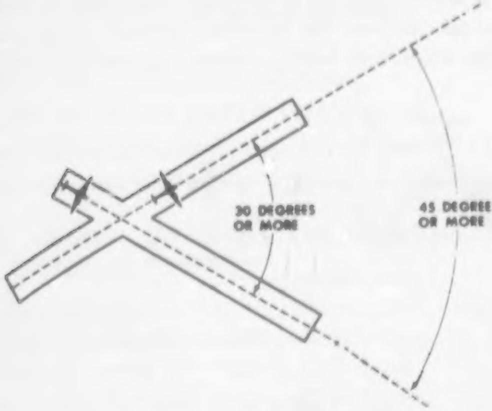

3,500 FEET — 0 - 14 DEGREES
2,000 FEET — 15 - 29 DEGREES
0 FEET — 30 DEGREES OR MORE
45 DEGREES OR MORE

6-10c(1) Illustration

(ii) 3,500 feet and the runways diverge by less than 15 degrees.

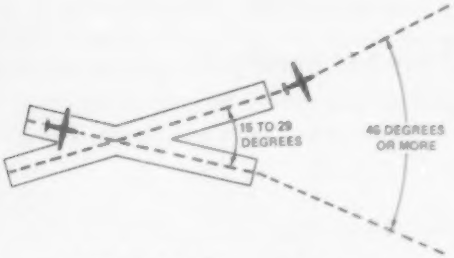
(2) Intersecting runways — Authorize takeoff of a succeeding aircraft when the preceding aircraft has passed the point of runway intersection, and

(a) The runways diverge by 30 degrees or more.


30 DEGREES
OR MORE
45 DEGREES
OR MORE

6-10c(2)(a) Illustration

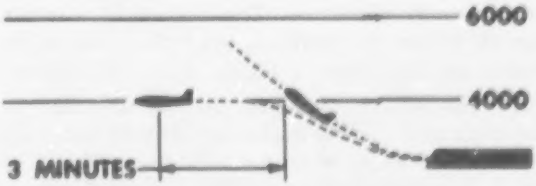
(b) The runways diverge by 15 to 29 degrees inclusive and the preceding aircraft has commenced a turn.


15 TO 29
DEGREES
45 DEGREES
OR MORE

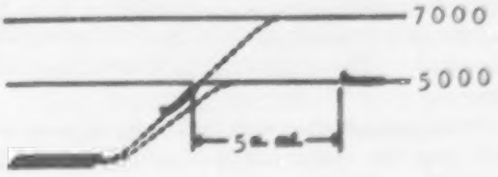
6-10c(2)(b) Illustration

6-11 MINIMA ON SAME COURSE

Separate aircraft that will fly the same course when the following aircraft will climb thorough the altitude assigned to the leading aircraft by using a minimum of *3 minutes* until the following aircraft passes through the assigned altitude of the leading aircraft; or *5 miles* if both aircraft are using DME.


6000
4000
3 MINUTES

6-11 Illustration 1


7000
5000
5 n. mi.

6-11 Illustration 2

6-12 thru 6-19 RESERVED

Section 3. INITIAL SEPARATION OF DEPARTING AND ARRIVING AIRCRAFT

6-20 SEPARATION MINIMA

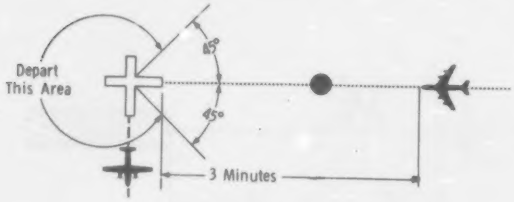
Separate a departing aircraft from an arriving aircraft making an instrument approach to the same airport by using one of the following minima until vertical or lateral separation is achieved:

a. *TERMINAL:* When takeoff direction differs by at least 45 degrees from the reciprocal of the final approach course — The departing aircraft takes off before the arriving aircraft leaves a fix inbound not less than *4 miles* from the airport.

b. *TERMINAL:* When takeoff direction is other than in a. — The departing aircraft takes off so that it is established on a course diverging by at least 45 degrees from the reciprocal of the final approach course before the arriving aircraft leaves a fix inbound not less than *4 miles* from the airport.

c. *TERMINAL:* When the absence of an appropriate fix precludes the application of **a** or **b**, and at airports where approach control service is not provided — The separation in **d** or **e** shall be applied.

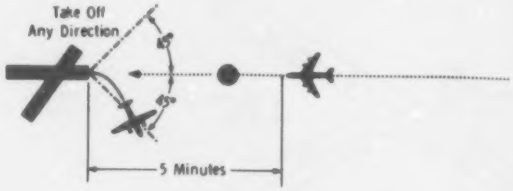
d. When takeoff direction differs by at least 45 degrees from the reciprocal of the final approach course — The departing aircraft takes off *3 minutes* before the arriving aircraft is estimated at the airport.



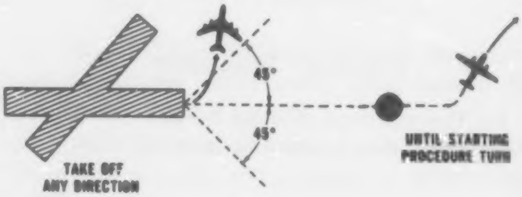
6-20d Illustration

ILLUSTRATION

e. When takeoff direction is other than in **d** — The departing aircraft takes off so that it is established on a course diverging by at least 45 degrees from the reciprocal of the final approach course *5 minutes* before the arriving aircraft is estimated at the airport or before it starts procedure turn.



6-20e Illustration 1



6-20e Illustration 2

6-21 thru 6-29 RESERVED

Section 4. LONGITUDINAL SEPARATION

6-30 APPLICATION

Separate aircraft longitudinally by requiring them to do one of the following, as appropriate:

a. Depart at a specified time.

b. Arrive at a fix at a specified time.

Phraseology:

CROSS (fix) AT OR BEFORE (time).

CROSS (fix) AT OR LATER THAN (time).

c. Hold at a fix until a specified time.

d. Change altitude at a specified time or fix.

6-31 MINIMA ON SAME, CONVERGING, OR CROSSING COURSES

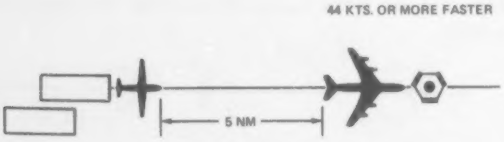
Separate aircraft on the same, converging, or crossing courses by an interval expressed in time or distance, using the following minima:

a. When the leading aircraft maintains a speed at least 44 knots faster than the following aircraft — *5 miles* between aircraft using DME and/or RNAV; or *3 minutes* between other aircraft if, in either case, one of the following conditions is met:

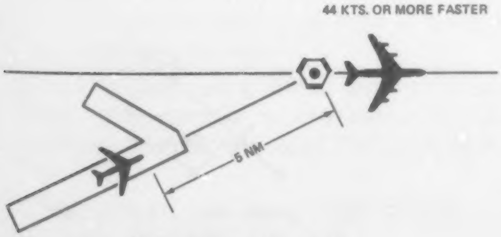
(1) A departing aircraft follows a preceding aircraft which has taken off from the same or adjacent airport.

(2) A departing aircraft follows a preceding en route aircraft which has reported over a fix serving the departure airport.

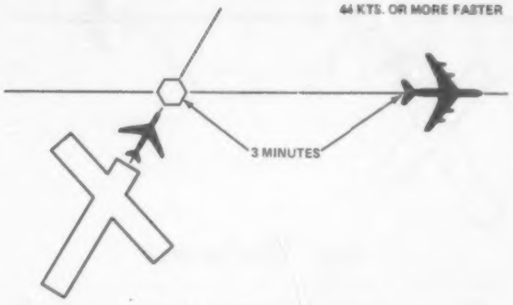
(3) An en route aircraft follows a preceding en route aircraft which has reported over the same fix.



6-31a Illustration 1



6-31a Illustration 2



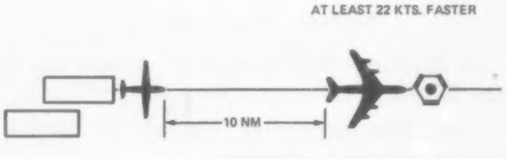
6-31a Illustration 3

b. When the leading aircraft maintains a speed at least 22 knots faster than the following aircraft — *10 miles* between aircraft using DME and/or RNAV; or *5 minutes* between other aircraft if, in either case, one of the following conditions exists:

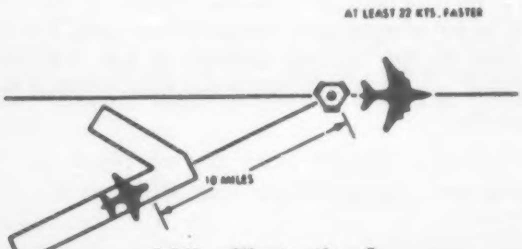
(1) A departing aircraft follows a preceding aircraft which has taken off from the same or an adjacent airport.

(2) A departing aircraft follows a preceding en route aircraft which has reported over a fix serving the departure airport.

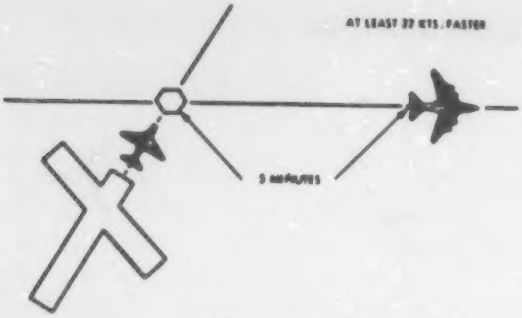
(3) An en route aircraft follows a preceding en route aircraft which has reported over the same fix.



6-31b Illustration 1



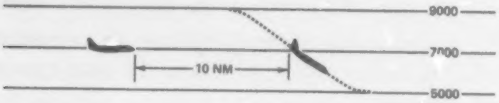
6-31b Illustration 2


AT LEAST 22 KTS. FASTER
5 MINUTES

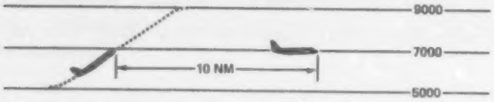
6-31b Illustration 3

c. When an aircraft is climbing or descending through the altitude of another aircraft:

(1) Between aircraft using DME — *10 miles,* if the descending aircraft is leading or the climbing aircraft is following.


9000
7000
5000
10 NM

6-31c(1) Illustration 1


9000
7000
5000
10 NM

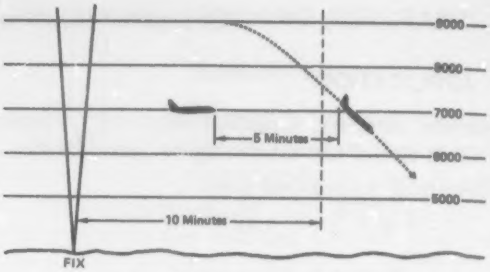
6-31c(1) Illustration 2

(2) Between other aircraft — *5 minutes,* if all of the following conditions are met:

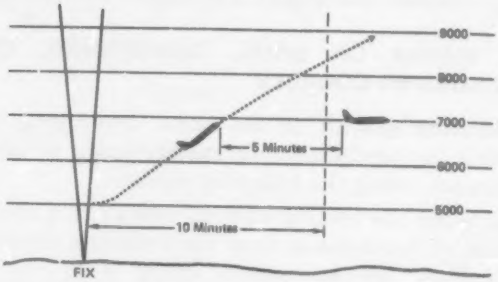
(a) The descending aircraft is leading or climbing aircraft is following.

(b) The aircraft were separated by not more than 4,000 feet when the altitude change started.

(c) The change is started within 10 minutes after a following aircraft reports over a fix reported over by the leading aircraft or has acknowledged a clearance specifying the time to cross the same fix.


9000
8000
7000
6000
5000
5 Minutes
10 Minutes
FIX

6-31c(2) Illustration 1


9000
8000
7000
6000
5000
5 Minutes
10 Minutes
FIX

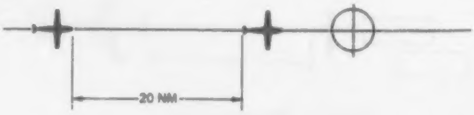
6-31c(2) Illustration 2

(3) Between RNAV aircraft that are operating along an RNAV route that is eight miles or less in width — *10 miles* provided the following conditions are met:

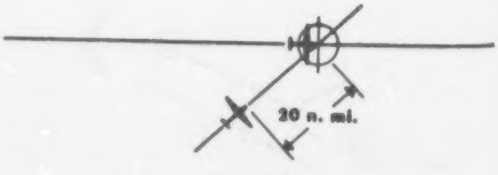
(a) The descending aircraft is leading or the climbing aircraft is following.

(b) The aircraft were separated by not more than 4,000 feet when the altitude change started.

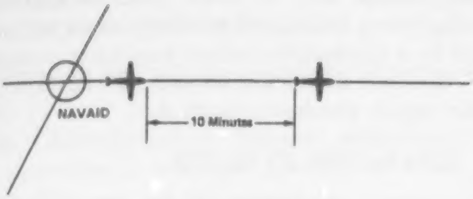
d. When the conditions of **a**, **b**, or **c** above cannot be met — *20 miles* between aircraft using DME and/or RNAV; or *10 minutes* between other aircraft.



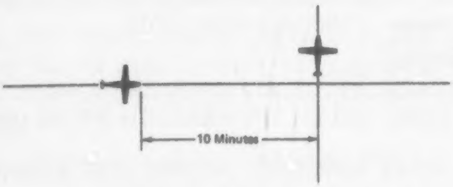
6-31d Illustration 1



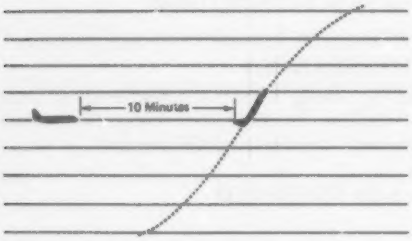
6-31d Illustration 2


NAVAID
10 Minutes

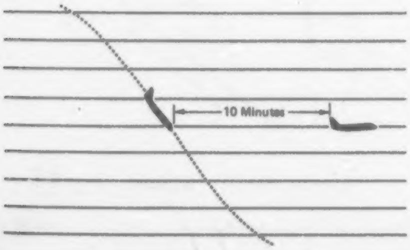
6-31d Illustration 3



6-31d Illustration 4



6-31d Illustration 5

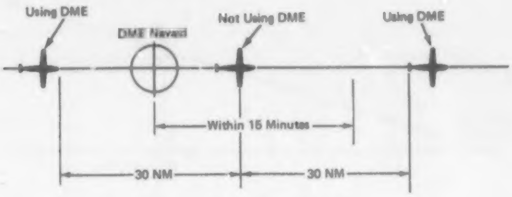


6-31d Illustration 6

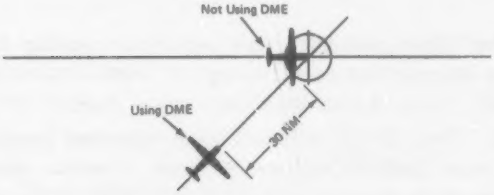
e. Between aircraft, when one aircraft is using DME and the other is not — *30 miles* if both the following conditions are met:

(1) The aircraft using DME derives distance information by reference to the same NAVAID over which the aircraft not using DME has reported.

(2) The aircraft not using DME is within 15 minutes of the NAVAID.


Using DME
DME Navaid
Not Using DME
Using DME
Within 15 Minutes
30 NM
30 NM

6-31e Illustration 1

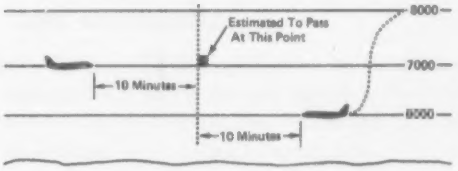

Not Using DME
Using DME
30 NM

6-31e Illustration 2

f. Between aircraft when one aircraft is using RNAV and the other is using neither DME nor RNAV — *30 miles.*

6-32 MINIMA ON OPPOSITE COURSES

Separate aircraft traveling opposite courses by assigning different altitudes consistent with the approved vertical separation from *10 minutes* before, until *10 minutes* after they are estimated to pass. Vertical separation may be discontinued after one of the following conditions is met:

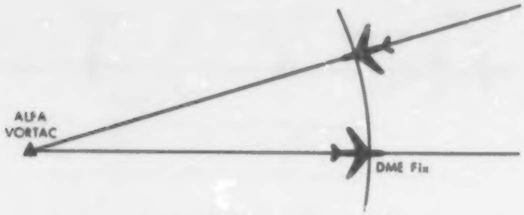

Estimated To Pass At This Point
8000
7000
6000
10 Minutes
10 Minutes

6-32 Illustration

6-32 Note. — RNAV route segments that have been expanded in the proximity to reference facilities for slant range effect are not to be considered "expanded" for purposes of applying separation criteria in this paragraph.

a. Both aircraft have reported passing NAVAID's or DME fixes indicating they have passed each other.

6-32a Note. — It is not intended to limit application of this procedure only to aircraft operating in opposite directions along the same airway or radial. This procedure may also be applied to aircraft established on diverging airways or radials of the same NAVAID.



6-32a Illustration

b. Both aircraft have reported passing the same intersection and they are at least *3 minutes* apart.

c. Two RNAV aircraft have reported passing the same position and are at least *8 miles* apart if operating along a route that is 8 miles or less in width; or *18 miles* apart if operating along an expanded route; except that *30 miles* shall be applied if operating along that portion of any route segment defined by a navigation station requiring extended usable distance limitations beyond 130 miles.

d. An aircraft utilizing RNAV and an aircraft utilizing VOR have reported passing the same position and the RNAV aircraft is at least *4 miles* beyond the reported position when operating along a route that is 8 miles or less in width; *9 miles* beyond the point when operating along an expanded route; except that *15 miles* shall be applied if operating along that portion of any route segment defined by a navigation station requiring extended usable distance limitation beyond 130 miles; or *3 minutes* apart whichever is greater.

6-33 SEPARATION BY PILOTS

When pilots of aircraft on the same course in direct radio communication with each other concur, you may authorize the following aircraft to maintain longitudinal separation of *10 minutes;* or *20 miles* if they are using DME.

Phraseology:

MAINTAIN AT LEAST ONE ZERO MINUTES/TWO ZERO MILES SEPARATION FROM (Ident).

6-34 RNAV AIRCRAFT ALONG VOR AIRWAYS/ROUTES

Advise the pilot to use DME distances when applying DME separation to an RNAV aircraft operating along VOR airways/routes.

Phraseology:

USE DME DISTANCES.

6-34 Note. — *Along track distance* derived from area navigation devices having slant range correction will not coincide with the direct DME readout.

6-35 thru 6-39 RESERVED

Section 5. LATERAL SEPARATION

6-40 SEPARATION METHODS

Separate aircraft by one of the following methods:

a. Clear aircraft on different airways or routes whose widths or protected airspace do not overlap.

6-40a Note. — Airspace protected for airways is based on airway widths described in FAR 71.5 and airspace protected for routes will be consistent with those widths. Airspace to be protected for RNAV routes, including SIDs and STARS, is defined in Order 7110.18.

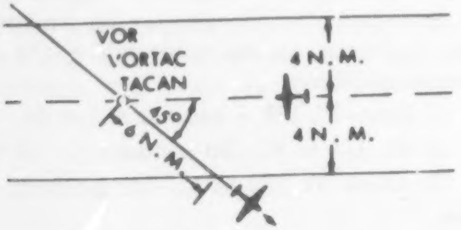
b. Clear aircraft below 18,000 to proceed to and report over or hold at different geographical locations determined visually or by reference to NAVAIDs.

c. Clear aircraft to hold over different fixes whose holding pattern airspace areas do not overlap each other or other airspace to be protected.

d. Clear departing aircraft to fly specified headings which diverge by at least 45 degrees.

6-41 MINIMA ON DIVERGING RADIALS.

a. Consider separation to exist between aircraft established on radials of the same NAVAID that diverge by at least 15 degrees when either aircraft is clear of the airspace to be protected for the other aircraft.



6-41a Illustration

6-41a Note. — The procedure may be applied to converging as well as diverging aircraft. For example, the aircraft depicted 6 miles from the NAVAID in Illustration 6-41a. would require vertical separation until reaching the 6-mile point. Reversing direction, the same aircraft would require vertical separation before passing the 6-mile point.

b. Use the Tables to determine the distance required for various divergence angles to clear the airspace to be protected. For divergence that falls between two values, use the lesser divergence value to obtain the distance.

6-41b Table 1. — Non-DME Divergence-Distance Minima

Divergence (Degrees)	*Distance (NM)*
15	16
20	12
25	10
30	8
35	7
45	6
55	5
90	4

6-41b Table 1. Note. — This Table is for non-DME application only.

6-41b Table 2. — Divergence-Distance Minima

Divergence (degrees)	*Distance (NM)*	
	Below FL 180	*FL 180 through FL 450*
15	17	18
20	13	15
25	11	13
30	9	11
35	8	11
45	7	11
55	6	11
90	5	11

6-41b Table 2. Note. — This Table is for DME application and compensates for DME slant-range error.

6-41b Note. — For altitudes of 3,000 feet or less above the elevation of the NAVAID, DME slant-range error is negligible and the values in 6-41b., Table 1. may be used.

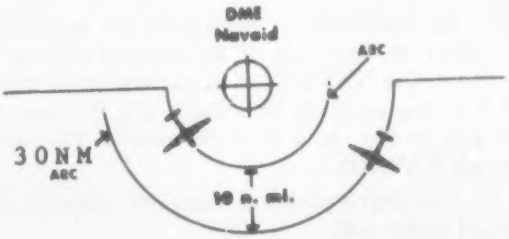
6-42 DME ARC MINIMA

Apply lateral DME separation by requiring aircraft using DME to fly an arc about a NAVAID at a specified distance using the following minima:

6-42 Reference. — NAVAID Terms, 2-91.

a. Between different arcs about a NAVAID regardless of direction of flight:

(1) At 35 miles or less from the NAVAID — *10 miles.*



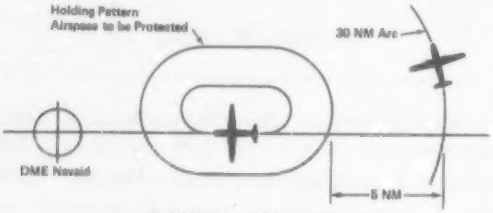
6-42a(1) Illustration

(2) More than 35 miles from the NAVAID — *20 miles.*

b. Between an arc about a NAVAID and other airspace to be protected:

6-42b Note. — The other airspace to be protected may be an MOA, a holding pattern, airway or route, ATCAA, warning area, restricted area, prohibited area, etc.

(1) At 35 miles or less from the NAVAID — *5 miles.*



6-42b(1) Illustration

(2) More than 35 miles from the NAVAID — *10 miles.*

Phraseology:

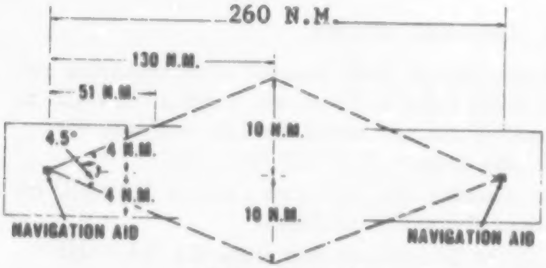
VIA (number of miles) MILE ARC (direction) OF (name of DME NAVAID).

6-43 MINIMA ALONG OTHER THAN ESTABLISHED AIRWAYS OR ROUTES

Protect airspace along other than established airways or routes as follows:

6-43 Reference. — Glossary (Airway, Route).

a. Direct courses and course changes of 15 degrees or less:



6-43a Illustration

(1) Via NAVAID's or radials FL 600 and below — *4 miles* on each side of the route to a point 51 miles from the NAVAID, then increasing in width on a 4 ½ degree angle to a width of *10 miles* on each side of the route at a distance of 130 miles from the NAVAID.

(2) Via degree-distance fixes for aircraft authorized under 4-32.

(a) Below FL 180 — *4 miles* on each side of the route.

(b) FL 180 to FL 600 inclusive — *10 miles* on each side of the route.

(3) Via degree-distance fixes for RNAV flights above FL 450 — *10 miles* on each side of the route.

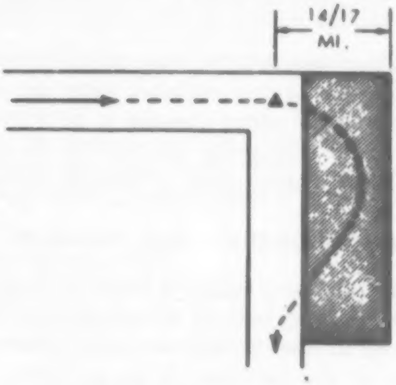
6-43a(3) Note. — Degree-distance RNAV flight (random routes) at FL 450 and below are provided radar separation.

b. When course change is 16 degrees through 90 degrees, protect the airspace on the overflown side, beginning at the point where the course changes, as follows:

(1) Below FL 180 — same as a(1) or (2).

(2) FL 180 to FL 230 inclusive — *14 miles.*

(3) Above FL 230 to FL 600 inclusive — *17 miles.*



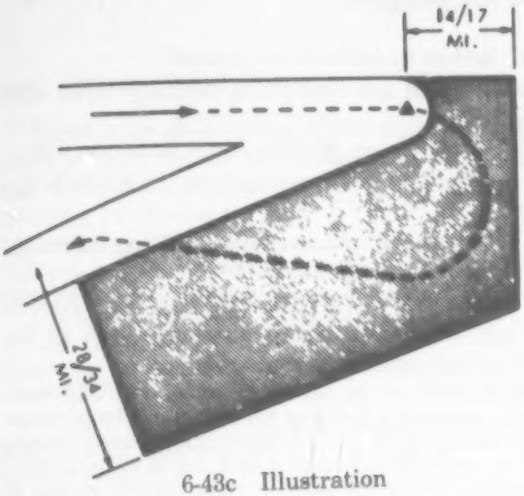
6-43b Illustration

c. When course change is 91 degrees through 180 degrees, protect the airspace on the overflown side, beginning at the point where the course changes, as follows:

(1) Below FL 180 — same as a(1) or (2).

(2) FL 180 to FL 230 inclusive — *28 miles.*

(3) Above FL 230 to FL 600 inclusive — *34 miles.*


14/17
MI.
28/34
MI.

6-43c Illustration

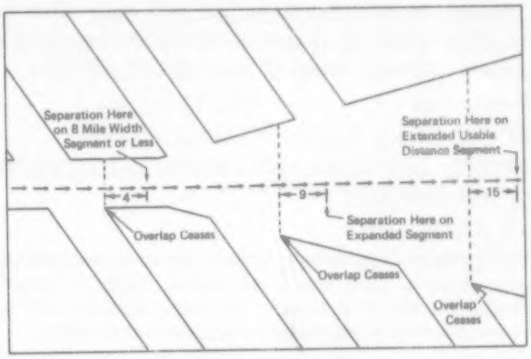
d. After the course changes specified in **b** or **c** have been completed and the aircraft is back on course, the appropriate minima in **a** may be used.

6-44 RNAV MINIMA — DIVERGING/CROSSING COURSES

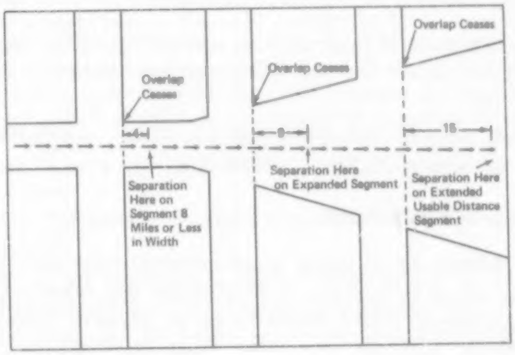
Consider lateral separation to exist when an RNAV aircraft is beyond the point where the lateral protected airspace of that aircraft has ceased to overlap the lateral protected airspace of another by at least:

a. When operating along a route that is 8 miles or less in width — *4 miles.*

b. When operating along an expanded route — 9 miles, except that 15 miles shall be applied along that portion of any route segment requiring extended usable distance limitation beyond 130 miles of the reference facility.


Separation Here
on 8 Mile Width
Segment or Less
Separation Here on
Extended Usable
Distance Segment
4
9
15
Separation Here on
Expanded Segment
Overlap Ceases
Overlap Ceases
Overlap
Ceases

6-44 Illustration 1


Overlap Ceases
Overlap Ceases
Overlap
Ceases
4
9
15
Separation
Here on
Segment 8
Miles or Less
in Width
Separation Here
on Expanded Segment
Separation Here
on Extended
Usable Distance
Segment

6-44 Illustration 2

6-45 thru 6-49 RESERVED

Section 6. VERTICAL SEPARATION

6-50 APPLICATION

Assign an altitude to an aircraft only after the aircraft previously at that altitude has reported or is observed (valid Mode C) leaving the altitude.

Phraseology:

REPORT LEAVING/REACHING (altitude).

REPORT LEAVING ODD/EVEN ALTITUDES/FLIGHT LEVELS.

SAY ALTITUDE.

6-50 Note. — Consider known aircraft performance characteristics, pilot furnished and/or Mode C detected information which indicate that climb/descent will not be consistent with the rates recommended in AIM.

6-50 Reference. — Altitude Verification-Automatic Readout, 5-37.

6-51 MINIMA BETWEEN ALTITUDES

Separate IFR aircraft by assigning different altitudes using the following minima between altitudes:

a. Up to and including FL 290— *1,000 feet.*

b. Above FL 290— *2,000 feet.*

6-52 EXCEPTIONS

Assign an altitude to an aircraft only after the aircraft previously at that altitude has reported or is observed (valid Mode C) at or passing through another altitude separated from the first by the appropriate minimum when:

a. Severe turbulence is reported.

b. Aircraft are conducting military aerial refueling.

6-52b Reference. — Military Aerial Refueling, 8-29.

c. The aircraft previously at the altitude has been:

(1) Issued a clearance permitting climb/descent at pilot's discretion.

(2) Cleared to CRUISE (altitude). However, do not use Mode C to effect separation with an aircraft on a cruise clearance.

6-52c(2) Note. — An aircraft assigned a CRUISE clearance is assigned a block of airspace from the minimum IFR altitude up to and including the assigned cruising altitude and climb/descent within the block is at pilot's discretion. When the pilot verbally reports leaving an altitude in descent he may not return to that altitude.

6-52c(2) Reference. — Glossary (Cruise).

6-53 SEPARATION BY PILOTS

When pilots of aircraft in direct radio communication with each other during climb and descent concur, you may authorize the lower aircraft, if climbing, or the upper aircraft, if descending, to maintain vertical separation.

Phraseology:

MAINTAIN AT LEAST ONE/TWO THOUSAND FEET ABOVE/BELOW (identification).

6-54 thru 6-59 RESERVED

Section 7. TIMED APPROACHES

6-60 APPLICATION

Timed approaches using either nonradar procedures or radar vectors to the final approach course may be used at airports served by a tower if the following conditions are met:

6-60 Note. – These procedures require NAVAID's and standard/special instrument approach procedures or adequate radar coverage which permit an aircraft to:

a. Hold at a fix located on the approach course or to be radar vectored to the final approach course for a straight-in approach in accordance with the minima specified in 6-64.

b. Proceed in the direction of the airport along the approach course crossing the holding/approach fix at a specified altitude, if required.

c. Continue descent for an approach to destination airport.

a. Direct communication is maintained with the aircraft until the pilot is instructed to contact the tower.

b. If more than one missed approach procedure is available, none require course reversal.

c. If only one missed approach procedure is available, the following conditions are met:

(1) Course reversal is not required.

(2) Reported ceiling and visibility are equal to or greater than the highest prescribed circling minimums for the instrument approach procedure in use.

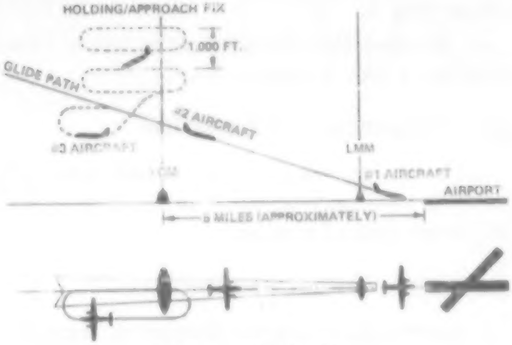
6-60c(2) Note. — Determination of whether or not an existing ceiling meets minima is accomplished by comparing MDA (MSL) with ceiling (AGL) plus the airport elevation.

6-61 APPROACH SEQUENCE

When an aircraft passes the final approach fix inbound, issue clearances for a succeeding timed approach in accordance with the following:

6-61 Reference. — Approach Separation Responsibility, 5-124.

a. Clear the succeeding aircraft for approach, to descend to the altitude vacated by the preceding aircraft, and to leave the final approach fix inbound at a specified time; or when using radar to sequence and position aircraft on the final approach course, vector aircraft to cross the final approach fix in compliance with 6-64, or

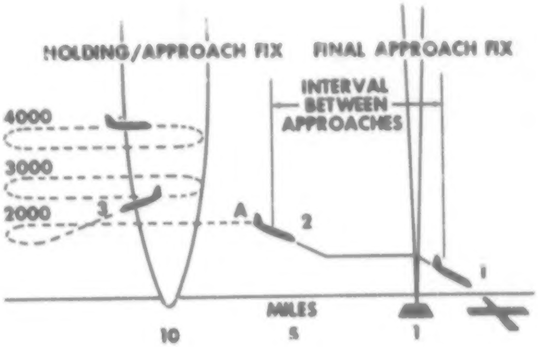


6-61a Illustration

This illustration depicts the application of timed approach procedures using an ILS and applying longitudinal separation only. Using an interval of 2 minutes between successive approaches, the #1 and #2 aircraft have already passed the outer locator (LOM) on final approach, and the #3 aircraft has been cleared for approach and to depart the LOM 2 minutes after the #2 aircraft reported leaving the LOM inbound on final approach. After aircraft in the approach sequence depart the holding/approach fix (LOM) inbound, vertical separation is no longer provided and longitudinal separation is utilized.

6-61a Reference. — Final Approach Course Interception, 5-121.

b. If an alternative missed approach procedure is not available and weather conditions are less than required by 6-60c., clear the succeeding aircraft for an approach after you are informed the preceding aircraft is in sight and its landing can be completed; and



6-61b Illustration

This illustration depicts the application of timed approach procedures using a holding/approach fix on a bearing of an NDB and applying a combination of longitudinal and vertical separation. The #3 aircraft has been instructed to descend to 2,000 after the #2 aircraft has reported departing the holding/approach fix inbound and leaving 2,000 at Point A. The #2 aircraft has departed the holding/approach fix inbound at the designated time, maintaining 2,000 until cleared for approach at Point A. The #1 aircraft has been sighted, enabling the controller to issue approach clearance to the #2 aircraft at Point A.

c. Release the aircraft to the tower before it reaches the final approach fix.

6-62 SEQUENCE INTERRUPTION

Interrupt the established timed approach sequence if necessary to allow an aircraft to execute a different type of approach.

6-63 LEVEL FLIGHT RESTRICTION

If the weather report indicates an aircraft will be in IFR conditions over the final approach fix when 6-61b. is applied, clear the second aircraft for an approach early enough to allow at least 1 minute of level flight before crossing the final approach fix.

6-64 INTERVAL MINIMA

Use a *2-minute* or *5-mile* radar interval (except for a small aircraft behind a heavy aircraft-use a *3-minute* or *6-mile* radar interval) as the minimum between successive approaches and increase the interval, as necessary, taking into account the:

6-64 Note. — Increased separation is required for small aircraft behind heavy aircraft because of the possible effects of wake turbulence.

6-64 Reference. — Approach Separation Responsibility, 5-124.

a. Relative speeds of aircraft concerned.

b. Existing weather conditions.

c. Distance between approach fix and airport.

d. Type of approach being made.

6-65 TIME CHECK

Issue a time check to an aircraft before specifying a time to leave the approach fix inbound unless the aircraft is vectored to the final approach course.

6-66 MISSED APPROACHES

a. If weather conditions are such that an aircraft will likely miss an approach, issue an alternative missed approach procedure to the next aircraft.

b. If an aircraft misses an approach, allow the next aircraft to continue approach if it has been assigned an alternative missed approach procedure. Retain radar control or hold any remaining aircraft at assigned altitudes until traffic conditions permit issuance of approach clearances.

c. When 6-61b. is applied and the first aircraft misses approach, retain radar control or clear the second aircraft to maintain the last assigned altitude (minimum holding altitude) and return to the holding/approach fix to hold until traffic conditions permit issuance of approach clearances.

TABLE OF CONTENTS

Chapter 7. VISUAL

Page

Section 1. GENERAL

7-1 Positive Control Area Restrictions ... 7-1
7-2 VFR Conditions ... 7-1
7-3 Approach Control Service for VFR Arriving Aircraft ... 7-1
7-4 Visual Holding of VFR Aircraft ... 7-1
7-5—7-9 Reserved ... 7-1

Section 2. VISUAL SEPARATION

7-10 Visual Separation ... 7-2
7-11—7-19 Reserved ... 7-2

Section 3. VFR-ON-TOP

7-20 VFR-On-Top ... 7-3
7-21 Altitude for Direction of Flight ... 7-3
7-22—7-29 Reserved ... 7-3

Section 4. APPROACHES

7-30 Visual Approach ... 7-4
7-31 Visual Approaches — Radar ... 7-4
7-32 Clearance for Visual Approach — Radar ... 7-5
7-33 Multiple Runway Application (Visual) — Radar ... 7-5
7-34 Charted Visual Flight Procedures (CVFP) ... 7-5
7-35 Contact Approach ... 7-6
7-36—7-39 Reserved ... 7-6

Section 5. SPECIAL VFR

7-40 Authorization ... 7-7
7-41 Priority ... 7-7
7-42 Separation ... 7-7
7-43 Altitude Assignment ... 7-7
7-44 Local Operations ... 7-7
7-45 Climb to VFR ... 7-8
7-46 Ground Visibility Below One Mile ... 7-8
7-47 Flight Visibility Below One Mile ... 7-8
7-48 Special VFR Helicopter Separation ... 7-8
7-49 Local Procedures ... 7-8
7-50—7-59 Reserved ... 7-10

Section 6. BASIC RADAR SERVICE TO VFR AIRCRAFT — TERMINAL

7-60 Application ... 7-11
7-61—7-69 Reserved ... 7-11

Section 7. STAGE II SERVICE — TERMINAL

7-70 Application ... 7-12
7-71 Service Availability ... 7-12
7-72 Initial Contact ... 7-12
7-73 Identification ... 7-12
7-74 Holding ... 7-12
7-75 Approach Sequence ... 7-12
7-76 Sequencing ... 7-12

TABLE OF CONTENTS—Continued

Page
7-77 Control Transfer 7-12
7-78 Abandoned Approach 7-12
7-79 VFR Departure Information 7-13
7-80 Service Provided When Tower Is Inoperative 7-13
7-81—7-89 Reserved 7-13

Section 8. STAGE III SERVICE — TERMINAL

7-90 Application 7-14
7-91 Issuance of EFC 7-14
7-92 Separation 7-14
7-93 Helicopter Traffic 7-14
7-94 Altitude Assignments 7-14
7-95 Approach Interval 7-14
7-96 TRSA Departure Information 7-15
7-97 TCA Methods 7-15

Chapter 7. VISUAL

Section 1. GENERAL

7-1 POSITIVE CONTROL AREA RESTRICTIONS

Do not apply visual separation or issue VFR or "VFR-on-top" clearances in positive control areas.

7-2 VFR CONDITIONS

a. You may clear aircraft to maintain "VFR conditions" if one of the following conditions exists:

(1) The pilot of an aircraft on an IFR flight plan requests a VFR climb/descent.

(2) *TERMINAL:* The clearance will result in noise abatement benefits where part of the IFR departure route does not conform to an FAA-approved noise abatement route or altitude.

(3) *TERMINAL:* The pilot has requested a practice instrument approach and is not on an IFR flight plan.

Phraseology:

MAINTAIN VFR CONDITIONS.

MAINTAIN VFR CONDITIONS UNTIL (time or fix).

MAINTAIN VFR CONDITIONS ABOVE/BELOW (altitude).

CLIMB/DESCEND VFR,

and, if required,

BETWEEN (altitude) AND (altitude),

or

ABOVE/BELOW (altitude).

7-2a(3) Reference. — Practice Approaches, 4-90.

b. When, in your judgment, there is reason to believe that flight in VFR conditions may become impractical, issue an alternative clearance which will ensure separation from all other aircraft for which you have separation responsibility.

Phraseology:

IF UNABLE, (alternative procedure), AND ADVISE.

7-3 APPROACH CONTROL SERVICE FOR VFR ARRIVING AIRCRAFT

TERMINAL

Where procedures have been established for arriving VFR aircraft to contact approach control for landing information, issue the following:

a. Wind, runway, and altimeter setting at the airport of intended landing. This information may be omitted if contained in the ATIS broadcast and the pilot states the appropriate ATIS code or if the pilot uses the phrase, "have numbers."

7-3a Note. — Pilot use of "have numbers" does not indicate receipt of the ATIS broadcast.

b. Traffic information on a workload permitting basis.

c. Time or place at which the aircraft is to contact the tower on local control frequency for further landing information.

d. When an aircraft makes initial contact with the tower, you may suggest that it contact approach control for landing and traffic information.

7-4 VISUAL HOLDING OF VFR AIRCRAFT

TERMINAL

When it becomes necessary to hold VFR aircraft at visual holding fixes, take the following actions:

a. Clear aircraft to hold at selected, prominent geographical fixes which can be easily recognized from the air, preferably those depicted on sectional charts.

7-4a Note. — At some locations, VFR checkpoints are depicted on Sectional Aeronautical and Terminal Area Charts. In selecting geographical fixes, depicted VFR checkpoints are preferred unless the pilot exhibits a familiarity with the local area.

7-4a Reference. — Visual Holding Point, 4-54.

b. Issue traffic information to aircraft cleared to hold at the same fix.

Phraseology:

HOLD AT (location) UNTIL (time or other condition),

TRAFFIC (description) HOLDING AT (fix, altitude if known),

or

PROCEEDING TO (fix) FROM (direction or fix).

7-5 thru 7-9 RESERVED

READEX FICHE

Section 2. VISUAL SEPARATION

7-10 VISUAL SEPARATION

Aircraft may be separated by visual means, as provided in this paragraph, when other approved separation is assured before and after the application of visual separation. To ensure that other separation will exist, consider aircraft performance, routes of flight, and weather conditions. Weather conditions must allow the aircraft to remain within sight until other separation exists. Do not apply visual separation between successive departures when departure routes and/or aircraft performance preclude maintaining separation.

7-10 Reference. — Traffic Advisories, 2-21; Application (Cautionary Advisory), 3-123, 3-124; Visual Approaches, 7-30, 7-31; Glossary (Visual Approach, Visual Separation).

a. *TERMINAL:* You may apply visual separation between aircraft under your facility's control within the terminal area, provided:

(1) You are in communication with at least one of the aircraft involved or have the capability to communicate instantaneously as prescribed in paragraph 3-102a.(2), and

(2) You see the aircraft and maintain visual separation between them, or

(3) A pilot sees another aircraft and you instruct him to maintain visual separation from it as follows:

(a) Tell the pilot about the other aircraft including position, direction and, unless it is obvious, the other aircraft's intention.

(b) Obtain acknowledgment from the pilot that the other aircraft is in sight.

(c) Instruct the pilot to maintain visual separation from that aircraft.

(d) Advise the pilot if the radar targets appear likely to converge.

7-10a(3)(d) Note. — Issue this advisory in conjunction with the instruction to maintain visual separation, or thereafter if the controller subsequently becomes aware that the targets are merging.

(e) If the aircraft are on converging courses, inform the other aircraft of the traffic and that visual separation is being applied.

Phraseology:

TRAFFIC, (clock position and distance), (direction)-BOUND, (type of aircraft), (intentions and other relevant information).

If applicable,

ON CONVERGING COURSE.

DO YOU HAVE IT IN SIGHT?

If the answer is in the affirmative,

MAINTAIN VISUAL SEPARATION FROM THAT TRAFFIC.

If aircraft are on converging courses, advise the other aircraft:

TRAFFIC, (clock position and distance), (direction)-BOUND, (type of aircraft). HAS YOU IN SIGHT AND WILL MAINTAIN VISUAL SEPARATION.

b. *EN ROUTE:* You may use visual separation in conjunction with visual approach procedures.

7-10b Reference. — Visual Approaches, 7-30, 7-31.

c. You may authorize a nonapproach control tower to provide visual separation between two aircraft within a control zone provided other separation is assured before and after the application of visual separation. Visual separation may be authorized between:

(1) An arriving and a departing aircraft when the tower has the arrival in sight.

(2) A departure and a departure when weather is at or above VFR minima.

(3) An arrival and an arrival provided the tower has both aircraft in sight and visual separation can be applied.

Phraseology:

VISUAL SEPARATION APPROVED BETWEEN (identification) AND (identification),

and for departing aircraft

(departing/ succeeding aircraft) RELEASED YOUR DISCRETION.

7-10c Note. — Separation of IFR aircraft before and after application of visual separation is an IFR control function (approach/departure/en route). A nonapproach control tower controller by accepting authorization for visual separation becomes responsible for ensuring that separation. Separation requirements also apply to VFR aircraft when IFR, TCA, or Stage III separation is prescribed. (See 4-90, 5-90, 7-31, and 7-90 thru 7-97).

7-11 thru 7-19 RESERVED

Section 3. VFR-ON-TOP

7-20 VFR-ON-TOP

a. You may clear an aircraft to maintain "VFR-on-top" if the pilot of an aircraft on an IFR flight plan requests the clearance.

Phraseology:

MAINTAIN VFR-ON-TOP.

b. You may clear an aircraft to climb through clouds, smoke, haze, or other meteorological formations and then to maintain "VFR-on-top" if the following conditions are met:

(1) The pilot requests the clearance.

(2) You inform the pilot of the reported height of the tops of the meteorological formation, or

(3) You inform the pilot that no top report is available.

(4) When necessary, you ensure separation from all other traffic for which you have separation responsibility by issuing an alternative clearance.

(5) When an aircraft is climbing to and reports reaching "VFR-on-top," reclear the aircraft to maintain "VFR-on-top."

Phraseology:

CLIMB TO AND REPORT REACHING VFR-ON-TOP,

and

TOPS REPORTED (altitude),

or

NO TOPS REPORTS.

IF NOT ON TOP AT (altitude), MAINTAIN (altitude),

and ADVISE.

MAINTAIN VFR-ON-TOP.

c. Do not clear an aircraft to maintain "VFR-on-top" between sunset and sunrise to separate holding aircraft from each other or from en route aircraft unless restrictions are applied to ensure the appropriate IFR vertical separation.

Phraseology:

MAINTAIN VFR-ON-TOP AT OR ABOVE/BELOW/BETWEEN (altitudes).

7-20c Examples. —

"Maintain VFR-on-top at or above one three thousand five hundred."

"Maintain VFR-on-top at or below one two thousand five hundred."

"Maintain VFR-on-top at or between six thousand and one zero thousand."

d. When, in your judgment, there is reason to believe that flight in VFR conditions may become impractical, issue an alternative clearance which will ensure separation from all other aircraft for which you have separation responsibility.

Phraseology:

IF UNABLE, (alternative procedure), AND ADVISE.

7-21 ALTITUDE FOR DIRECTION OF FLIGHT

Inform an aircraft, maintaining "VFR-on-top," when a report indicates the pilot is not complying with FAR 91.109.

7-21 Note. — As required by FAR 91.109, the appropriate VFR altitudes for aircraft (not in a holding pattern of 2 minutes or less, or turning) operating *more than 3,000 feet above the surface to and including FL 290:*

Magnetic courses 0-179 — Odd cardinal altitudes plus 500 feet (e.g., 3,500, 5,500, FL 195, 275).

Magnetic courses 180-359 — Even cardinal altitudes plus 500 feet (e.g., 4,500, 8,500, FL 205, 285).

Above FL 290:

Magnetic courses 0-179 — 4,000 foot intervals beginning with FL 300 (e.g., FL 300, 340, 380).

Magnetic courses 180-359 — 4,000 foot intervals beginning with FL 320 (e.g., 320, 360, 400).

Phraseology:

VFR-ON-TOP CRUISING LEVELS FOR YOUR DIRECTION OF FLIGHT ARE:

More than 3,000 feet above the surface to FL 290:

ODD/EVEN ALTITUDES/FLIGHT LEVELS

PLUS FIVE HUNDRED FEET.

Above FL 290:

FOUR THOUSAND FOOT INTERVALS BEGINNING AT FLIGHT LEVEL THREE ZERO ZERO/THREE TWO ZERO.

7-22 thru 7-29 RESERVED

Section 4. APPROACHES

7-30 VISUAL APPROACH

ARTCC's, approach control facilities, and towers may clear aircraft for a visual approach if the following conditions exist:

7-30 Note 1. — Towers may exercise visual approach clearance authority only if authorized by a letter of agreement with the facility providing IFR service or at collocated facilities, a facility directive.

7-30 Note 2. — A visual approach is not an instrument approach procedure and, therefore, has no missed approach segment nor provision for a missed approach. Aircraft unable to complete a visual approach are expected to be handled as any go-around by providing appropriate separation.

a. Potential conflicts with all other aircraft have been resolved.

b. Weather conditions at the airport of intended landing are reported VFR or at airports without weather reporting service, the pilot has been informed that weather is not available and there is reasonable assurance that descent and flight to the airport can be made in VFR conditions.

7-30b Note. — Prior to initiating visual approaches to airports without weather reporting, controllers are expected to consider weather conditions in the area using the sources available, including nearby observations and pilot reports. A pilot-initiated request for a visual approach indicates that descent and flight to the airport can be made in VFR conditions.

c. The pilot has reported sighting the airport.

d. The aircraft is number one in the approach sequence or has reported the preceding aircraft in sight and is instructed to follow it if the aircraft is landing on the same runway. When the preceding traffic is landing on another runway and visual separation is being applied, advise the aircraft of the traffic's intentions and instruct it to maintain visual separation.

7-30d Examples. —

"Cessna Five Six November follow the heavy American Seven Forty-seven cleared for a visual approach to Runway One. Caution, wake turbulence."

"Delta Nine Sixty-four maintain visual separation from the United Seven Twenty-seven landing Runway Two Eight. Cleared for a visual approach to Runway Three Three."

7-30 Reference. — Visual Separation, 7-10.

7-31 VISUAL APPROACHES — RADAR

a. Vectors for a visual approach — You may vector aircraft for a visual approach to the airport of intended landing if the following conditions are met:

7-31a Example 1. — *Controlled Airport:*

"Cessna Four Five Victor turn right heading zero eight zero. Vector for a visual approach to Runway One Seven."

7-31a Example 2. — *Uncontrolled Airport:*

"Aztec Two Four Bravo turn left heading two seven zero. Vector for a visual approach to Martin Airport."

(1) At airports with weather reporting service — The reported ceiling at the airport of intended landing is at least 500 feet above the minimum vectoring altitude and visibility is 3 miles or more, or

(2) At airports without weather reporting service — The pilot has been informed that weather is not available and there is reasonable assurance that descent and flight to the airport can be made in VFR conditions.

7-31a(2) Note. — Prior to initiating vectors for visual approaches to airports without weather reporting, controllers are expected to consider weather conditions in the area using the sources available, including nearby observations and pilot reports. A pilot-initiated request for a visual approach indicates that descent and flight to the airport can be made in VFR conditions.

(3) Separation is provided from any preceding IFR/Stage III aircraft until visual separation is provided.

b. Vectors for simultaneous approaches at tower-controlled airports — You may vector aircraft simultaneously for visual approaches while other aircraft are conducting any type approach to the same runway or another runway or airport if the conditions in a are met.

c. Continue radar monitoring and traffic information until the aircraft is instructed to contact the tower, the FSS, or upon pilot request, UNICOM or airline company radio when the destination airport is not tower controlled.

7-31c Note 1. — The point at which an aircraft is instructed to contact the tower will vary depending on the runway in use, weather, etc. It is determined by prior coordination between the tower/center controller. Ordinarily, the changeover points are established far enough from the airport so that the tower controller can properly establish a landing sequence, normally prior to entering the airport traffic area.

7-31c Note 2. — When the destination is not a tower-controlled airport, the aircraft may be released to advisory frequency after potential conflicts with known traffic have been resolved.

7-31c Note 3. — Visual approaches and CVFP's are not instrument approach procedures; therefore, they have no missed approach segments. An aircraft unable to complete a visual approach or a CVFP is expected to be handled as any go-around by providing appropriate separation.

7-32 CLEARANCE FOR VISUAL APPROACH — RADAR

A radar controlled aircraft may be cleared for a visual approach provided the following conditions are met:

a. Traffic conflicts with other aircraft have been resolved, and

b. An aircraft not following another aircraft on approach reports the airport in sight, or

c. An aircraft reports sighting a preceding aircraft landing on the same runway and has been instructed to follow it, or

d. An aircraft reports the airport but not the preceding aircraft in sight, provided radar separation is maintained or visual separation is provided.

e. The aircraft is and can remain in VFR conditions.

f. Weather conditions at the airport are reported VFR; or at airports without weather reporting service, the pilot has been informed that weather is not available.

g. The tower is informed of the aircraft's position prior to communications transfer.

7-32 Note 1. — If an aircraft is being vectored for an instrument approach and subsequently reports the airport in sight, controllers may initiate a visual approach or pilots may request a visual approach. Under these conditions, the provisions of 7-31a.(1) are not applicable, and a controller's only obligation as it relates to weather is to ensure compliance with 7-32f and to only authorize such operations when weather conditions are clearly not a prohibiting factor.

7-32 Note 2. — ARTS functions may be used to inform the tower if a facility directive or letter of agreement specifies control and communications transfer points.

7-32a Reference. — Airport traffic areas, 2-16; Arrival Information by Approach Control Facilities, 4-71.

7-33 MULTIPLE RUNWAY APPLICATION (VISUAL) — RADAR

a. Parallel runways separated by less than 2,500 feet — Unless standard separation is provided by ATC, an aircraft must report sighting a preceding aircraft making an approach to the same or parallel runway, and all aircraft are informed that approaches are being conducted to the parallel runway. (DO NOT PERMIT A HEAVY AIRCRAFT TO OVERTAKE ANOTHER AIRCRAFT.)

b. Parallel runways separated by at least 2,500 feet but less than 4,300 feet — Headings must be assigned which will permit aircraft to intercept the extended centerline of the runway at an angle not greater than 30 degrees unless standard separation is provided during the turn-on. Once the aircraft are established within 30 degrees of the final, these operations may be conducted simultaneously. All aircraft must be informed that approaches are being conducted to the parallel runway. (DO NOT PERMIT THE RESPECTIVE AIRCRAFTS' PRIMARY RADAR RETURNS TO MERGE UNLESS VISUAL SEPARATION IS BEING APPLIED.)

7-33b Note. — The intent of the 30-degree intercept angle is to reduce the potential for overshoots of the final and to preclude side-by-side operations with one or both aircraft in a "belly-up" configuration during the turn-on. Aircraft performance, speed, and the number of degrees of turn to the final are factors to be considered by the controller when vectoring to parallel runways.

c. Intersecting/converging runways, or parallel runways separated by 4,300 feet or more — These operations may be conducted simultaneously provided standard separation is maintained until the aircraft has received and acknowledged for a visual approach clearance and all aircraft are informed that approaches are being conducted to the other runway. (DO NOT PERMIT THE RESPECTIVE AIRCRAFTS' PRIMARY RADAR RETURNS TO MERGE UNLESS VISUAL SEPARATION IS BEING APPLIED.)

7-33c Note. — Although simultaneous approaches may be conducted to intersecting runways when the conditions in 7-33c are met, staggered approaches may be necessary to meet the airport separation requirements as specified in paragraph 3-124.

7-34 CHARTED VISUAL FLIGHT PROCEDURES (CVFP)

USA/USAF/USN NOT APPLICABLE. Charted visual flight procedures may be used if all the following conditions are met:

a. The approach must be conducted in a radar environment.

b. There must be an operating control tower.

c. Reported weather meets the criteria in 7-31a(1) unless higher minimums are published for the particular CVFP.

d. The published name of the CVFP and the landing runway are specified in the clearance.

7-34d Example. —

"United Six Ten cleared for a Bridge Visual Runway Two Eight Right Approach."

e. An aircraft not following another aircraft on approach reports sighting a charted visual landmark, or

f. An aircraft reports sighting a preceding aircraft landing on the same runway and has been instructed to follow it, or

7-34f Example —

"Republic Four Twelve follow the United heavy Seven Forty-seven. Cleared for a Stadium Visual Runway Two Four Approach. Caution, wake turbulence."

g. When using parallel or intersecting/converging runways, the criteria specified in 7-33 are applied.

7-34 Note. — Altitudes depicted on CVFP's are recommended altitudes only, they are not established for air traffic separation.

7-35 CONTACT APPROACH

Clear an aircraft for a contact approach only if the following conditions are met:

a. The pilot has requested it.

7-35a Note. — This procedure is intended primarily as an alternative for an instrument approach procedure by an aircraft on an IFR flight plan, operating clear of clouds with at least 1 mile flight visibility. When executing a contact approach, the pilot is responsible for maintaining the required flight visibility, cloud clearance, and terrain/obstruction clearance. Unless otherwise restricted, the pilot may find it necessary to descend, climb, and/or fly a circuitous route to the airport to maintain cloud clearance and/or terrain/obstruction clearance. It is not in any way intended that controllers will initiate or suggest a contact approach to a pilot.

b. The reported ground visibility is at least 1 statute mile.

c. Approved separation is applied between aircraft so cleared and other IFR or Special VFR aircraft. When applying vertical separation, do not assign a fixed altitude but clear the aircraft at or below an altitude which is at least 1,000 feet below any IFR traffic but not below the minimum safe altitude prescribed in FAR 91.79.

7-35c Note. — FAR 91.79 specifies the minimum safe altitude to be flown (1) over congested areas, (2) other than congested areas, and (3) anywhere to provide for an emergency landing in the event of power failure and without undue hazard to persons or property on the surface.

d. An alternative clearance is issued when weather conditions are such that a contact approach may be impracticable.

Phraseology:

CLEARED FOR CONTACT APPROACH,

and, if required,

AT OR BELOW (altitude) (routing).

IF NOT POSSIBLE (alternative procedures) AND ADVISE.

7-36 thru 7-39 RESERVED

Section 5. SPECIAL VFR

7-40 AUTHORIZATION

Special VFR (SVFR) operations in weather conditions less than basic VFR minima are authorized at any location not prohibited by FAR 93.113 or when an exemption to FAR 93.113 has been granted and an associated letter of agreement established only:

a. Within control zones.

b. When requested by the pilot.

c. On the basis of weather conditions reported at the airport of intended landing/departure, or

7-40c Reference. — Climb to VFR, 7-45; Ground Visibility Below One Mile, 7-46.

d. When weather conditions are not reported at the airport of intended landing/departure and the pilot advises he is unable to maintain VFR and requests Special VFR.

Phraseology:

CLEARED TO ENTER/OUT OF/THROUGH CONTROL ZONE, *and, if required,* (direction) OF (airport name) AIRPORT (specified routing), *and* MAINTAIN SPECIAL V-F-R CONDITIONS WHILE IN CONTROL ZONE; *or as applicable for operation under an exemption from FAR 93.113:* CLEARED FOR (coded arrival or departure procedure) ARRIVAL/DEPARTURE, (additional instructions as required).

7-40 Note. — FAR 91.107(e) limits the use of Special VFR by pilots of fixed-wing aircraft to daylight hours except where the pilot is instrument rated and currently qualified, and the aircraft is equipped for IFR flight.

7-41 PRIORITY

a. FW/SVFR flights may be approved only if arriving and departing IFR aircraft are not delayed.

7-41a Example 1. —

A FW/SVFR aircraft has been cleared to enter the control zone and subsequently an IFR aircraft is ready to depart or is in position to begin an approach. Less overall delay might accrue to the IFR aircraft if the FW/SVFR aircraft is allowed to proceed to the airport and land, rather than leave the control zone or be repositioned to provide IFR priority.

7-41a Example 2. —

A FW/SVFR aircraft is number one for takeoff and located in such a position that the number two aircraft, an IFR flight, cannot taxi past to gain access to the runway. Less overall delay might accrue to the IFR aircraft by releasing the FW/SVFR departure rather than by having the aircraft taxi down the runway to a turnoff point so the the IFR aircraft could be released first.

7-41a. Note. — The priority afforded IFR aircraft over FW/SVFR aircraft is not intended to be so rigidly applied that it causes grossly inefficient use of airspace. If better overall efficiency will be gained thereby, the controller has the prerogative of allowing completion of the FW/SVFR operation already in progress when an IFR aircraft becomes a factor.

b. When clearance cannot be granted for a FW/SVFR flight because of IFR traffic, inform the aircraft of the anticipated delay. Do not issue EFC or expected departure time.

Phraseology:

EXPECT (number) MINUTES DELAY, (additional instructions as necessary).

7-42 SEPARATION

Apply approved separation between:

a. Special VFR aircraft.

b. Special VFR aircraft and IFR aircraft.

7-42 Note. — Approved separation is that prescribed for IFR and Special VFR in Chapter 7, Section 5. Radar vectors are authorized as prescribed in 5-90.

7-43 ALTITUDE ASSIGNMENT

Do not assign a fixed altitude when applying vertical separation, but clear the Special VFR aircraft at or below an altitude which is at least 500 feet below any conflicting IFR traffic but not below the minimum safe altitude prescribed in FAR 91.79.

Phraseology:

MAINTAIN SPECIAL V-F-R CONDITIONS AT OR BELOW (altitude).

7-43 Note 1. — Special VFR aircraft are not assigned fixed altitudes because of the clearance from clouds requirement.

7-43 Note 2. — The minimum safe altitudes are (1) over congested areas, an altitude at least 1,000 feet above the highest obstacle, and (2) over other than congested areas, an altitude at least 500 feet above the surface.

7-44 LOCAL OPERATIONS

Authorize local Special VFR operations for a specified period (series of landings and takeoffs, etc.) upon request if the aircraft can be recalled when traffic or weather conditions require. Where warranted, letters of agreement may be consummated.

Phraseology:

LOCAL SPECIAL V-F-R OPERATIONS IN THE IMMEDIATE VICINITY OF (airport name) AIRPORT ARE AUTHORIZED UNTIL (time). MAINTAIN SPECIAL V-F-R CONDITIONS.

7-44 Reference. — Order 7210.3 — 431, Appropriate Subjects.

7-45 CLIMB TO VFR

Authorize an aircraft to climb to VFR upon request if the only weather limitation is restricted visibility.

Phraseology:

CLIMB TO V-F-R WITHIN THE CONTROL ZONE/WITHIN (a specified distance within control zone) MILES FROM (airport name) AIRPORT, MAINTAIN SPECIAL V-F-R CONDITIONS UNTIL REACHING V-F-R.

7-46 GROUND VISIBILITY BELOW ONE MILE

When the ground visibility is officially reported at an airport as less than 1 mile, treat requests for Special VFR operations at that airport by other than helicopters as follows:

7-46 Note. — FAR 91 does not prohibit helicopter Special VFR flights when visibility is less than 1 mile.

a. Inform departing aircraft that ground visibility is less than 1 mile and that a clearance cannot be issued.

b. Inform arriving aircraft, operating outside of the control zone, that ground visibility is less than 1 mile and that, unless an emergency exists, a clearance cannot be issued.

c. Inform arriving aircraft, operating within the control zone, that ground visibility is less than 1 mile, and ask if the aircraft can depart the control zone with a flight visibility of at least 1 mile. If the reply is "yes," issue a clearance out of control zone. If the reply is "no," or an emergency exists, issue a clearance as soon as traffic conditions permit.

d. Authorize scheduled air carrier aircraft in the United States to conduct operations if ground visibility is not less than ½ statute mile.

7-46d Note. — FAR 121 permits landing or takeoff by domestic scheduled air carriers where a local surface restriction to visibility is not less than ½ statute mile, provided all turns after takeoff or before landing and all flights beyond 1 statute mile from the airport boundary can be accomplished above or outside the area so restricted. The pilot is solely responsible for determining if the nature of the visibility restriction will permit compliance with the provisions of FAR 121.

e. Clear an aircraft to fly through the control zone if he reports flight visibility is at least 1 statute mile.

7-47 FLIGHT VISIBILITY BELOW ONE MILE

When weather conditions are not officially reported at an airport and the pilot advises the flight visibility is less than 1 statute mile, treat requests for Special VFR operations at that airport by other than helicopters as follows:

7-47 Note. — FAR 91 prescribes use of officially reported ground visibility at airports where it is provided, and landing or takeoff "flight visibility" where it is not, as the governing ground visibility for basic and Special VFR operations.

a. Inform departing aircraft that a clearance cannot be issued.

b. Inform arriving aircraft operating outside of the control zone that a clearance cannot be issued unless an emergency exists.

c. Ask an arriving aircraft operating within a control zone if he can depart the control zone with a flight visibility of at least 1 statute mile. If the aircraft cannot depart the control zone accordingly, or an emergency exists, issue a clearance as soon as traffic conditions permit.

7-48 SPECIAL VFR HELICOPTER SEPARATION

a. Control a Special VFR helicopter by Special VFR procedures unless other procedures are contained in a letter of agreement.

TERMINAL

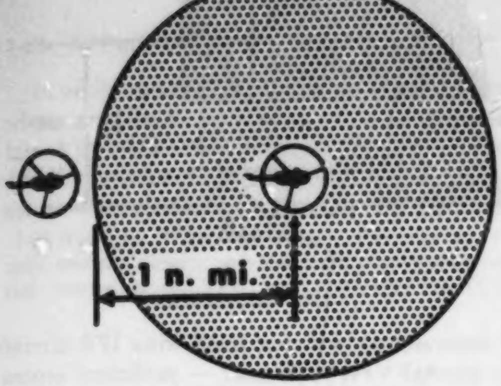
b. Control a Special VFR helicopter by visual separation or Special VFR procedures unless local procedures are contained in a letter of agreement.

7-48 Note. — Control of IFR helicopters is governed by nonradar or radar procedures and minima.

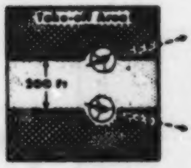
7-49 LOCAL PROCEDURES

At locations where the volume or complexity of helicopter operations warrants, a letter of agreement shall specify that Special VFR helicopters are required to maintain visual reference to the surface and the traffic patterns, routes and reporting or holding fixes necessary to achieve separation, in accordance with the following minima:

a. Between Special VFR helicopters — *1 mile.* You may, however, use *200 feet* if they are departing simultaneously on diverging courses and you can determine this minimum by reference to the surface markings or you instruct one to remain at least 200 feet from each other.



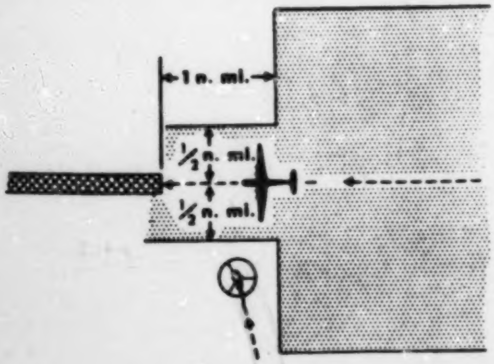
7-49a Illustration 1



7-49a Illustration 2

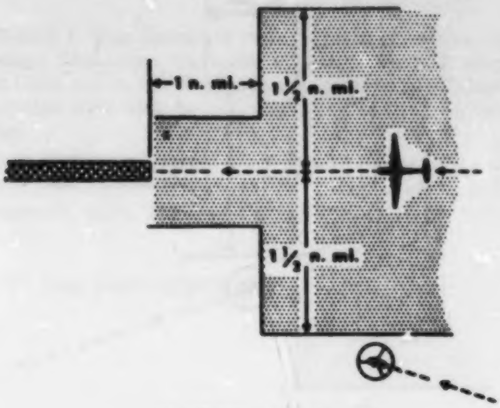
b. Between an arriving Special VFR helicopter and an arriving fixed wing IFR aircraft executing a straight-in approach:

(1) If the fixed wing aircraft is less than 1 mile from the landing threshold — *½ mile.*



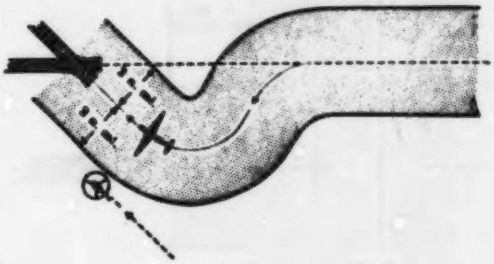
7-49b(1) Illustration

(2) If the fixed wing aircraft is 1 mile or more from the landing threshold — *1 ½ miles.*

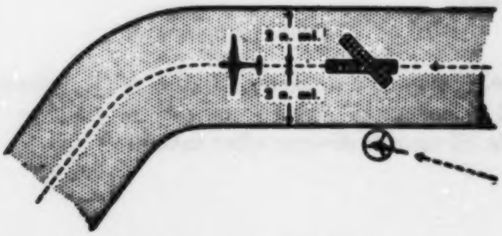


7-49b(2) Illustration

c. Between an arriving fixed wing IFR aircraft executing a circling approach or a missed approach and an arriving Special VFR helicopter — *2 miles.*



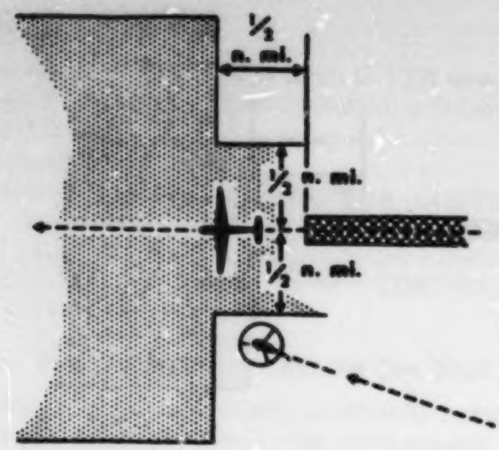
7-49c Illustration 1



7-49c Illustration 2

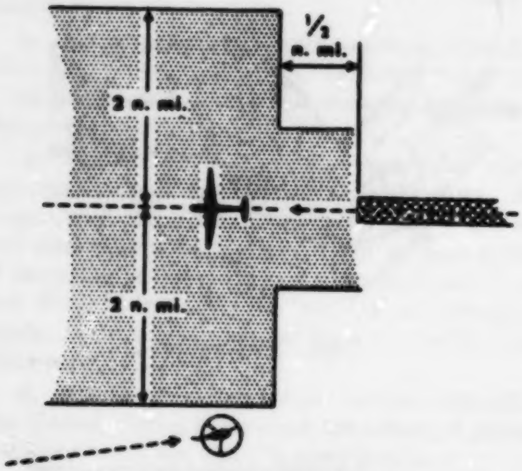
d. Between a departing fixed wing IFR aircraft and a Special VFR helicopter:

(1) If the fixed wing aircraft is less than ½ mile beyond the runway end — *½ mile.*



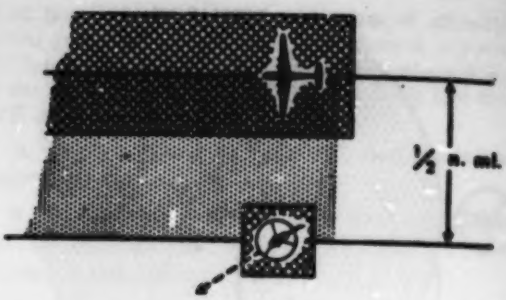
7-49d(1) Illustration

(2) If it is ½ mile or more beyond the runway end — *2 miles.*



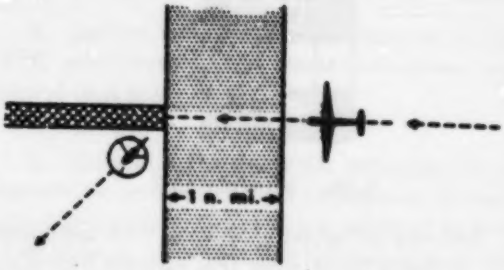
7-49d(2) Illustration

e. Between a departing Special VFR helicopter and a departing fixed wing IFR aircraft — ½ *mile,* if courses diverge after takeoff.



7-49e Illustration

f. Between an arriving fixed wing IFR aircraft and a Special VFR helicopter — sufficient separation to assure that the helicopter takes off on a diverging course before the arriving aircraft is 1 mile from the airport.



7-49f Illustration

7-50 thru 7-59 RESERVED

Section 6. BASIC RADAR SERVICE TO VFR AIRCRAFT — TERMINAL

7-60 APPLICATION

In addition to the radar services prescribed elsewhere in Chapter 5, apply the procedures contained in 7-3 when arriving VFR aircraft are handled by approach control and provide vectoring service in accordance with Chapter 5, Section 6.

7-60 Note. — When the Stages of service were developed, two basic radar services (traffic advisories and limited vectoring to VFR aircraft) were identified as STAGE I. This definition became, over the years, unnecessary. Therefore, the term STAGE I has been eliminated from use in the field and the handbooks. These basic services shall still be provided as prescribed in this section.

7-60 Reference. — Airport Traffic Areas, 2-16. Order 7210.3, Chapter 13, Section 1, National Terminal Radar Program. AIM, Terminal Radar Programs for VFR Aircraft.

7-61 thru 7-69 RESERVED

Section 7. STAGE II SERVICE — TERMINAL

7-70 APPLICATION

In addition to the basic radar services prescribed in 7-60, apply Stage II procedures at those locations where a program has been established for this purpose. If an aircraft desires the service but cannot communicate on the appropriate frequencies, provide the service to the extent possible using an available frequency. Aircraft which do not desire Stage II service may be fitted into the landing sequence by the tower. Coordination of these aircraft shall be accomplished with the approach control unless a facility directive/letter of agreement prescribes otherwise. Nonparticipating aircraft shall, to the extent possible, be given the same landing sequence they would have received had they been sequenced by radar vectors.

7-70 Note. — The service is mandatory on the controller's part unless the pilot declares that he does not want to participate. Arriving aircraft are assumed to want Stage II service unless the pilot states "Negative Stage II," or makes a similar comment.

7-71 SERVICE AVAILABILITY

Inform aircraft on initial contact whenever this service cannot be provided because of radar outage and apply paragraph 7-3.

7-72 INITIAL CONTACT

An aircraft sighted by the local controller at the time of first radio contact may be positioned in the landing sequence after coordination with approach control.

7-73 IDENTIFICATION

Identify the aircraft before taking action to position it in the approach sequence.

7-74 HOLDING

When holding is required to establish an approach sequence, you may hold VFR aircraft over the initial reporting fix or a fix near the airport. Hold IFR aircraft in accordance with IFR procedures when necessary to fit them into the approach sequence.

7-74 Reference. — Visual holding of VFR aircraft, 7-4.

7-75 APPROACH SEQUENCE

In establishing aircraft in the approach sequence, do not assign landing sequence numbers unless this responsibility has been delegated to you in a letter of agreement or facility directive.

7-75 Note. — The landing sequence is ordinarily established by the local controller.

7-76 SEQUENCING

a. After you establish radar contact, instruct a VFR aircraft to enter the traffic pattern at a specified point or vector it to a position in the approach sequence and inform the pilot of the aircraft he is to follow. If the integrity of the approach sequence depends upon visual contact with a preceding aircraft, ensure that visual contact is established and that instructions to follow the aircraft are issued.

Phraseology:

FOLLOW (description) (position, if necessary).

b. You may direct a VFR aircraft to a point near the airport and instruct it to hold until it is positioned in the approach sequence for the runway in use; or, after coordination with the tower, you may vector it to another runway.

c. IFR sequencing for visual approach — Apply the provisions of 7-31.

7-76c Reference. — Glossary (Visual Approach).

d. Radar sequencing behind a heavy jet — Apply the provisions of 5-72.

7-77 CONTROL TRANSFER

a. Instruct the pilot to contact the tower and inform the local controller of the aircraft's position. If, however, the local controller sights the aircraft before you take the action specified above, instruct the aircraft to change to local control frequency if space is available in the landing sequence, or

7-77a Note. — The point at which an aircraft is instructed to contact the tower is determined by prior coordination between the tower controller and the approach controller and will vary, depending on the runway in use, weather, etc. Ordinarily, the changeover occurs at least 5 miles from the runway. Changeover points should be far enough from the airport so that the tower controller can sequence the aircraft properly, but not at a distance that could derogate the provision of radar traffic information service.

b. Where the approach control ARTS track data is being displayed on the tower's BRITE display, the aircraft is tagged by ARTS, and a facility directive specifies change of communications and control jurisdiction points, instruct the pilot to contact the tower at the appropriate point.

7-78 ABANDONED APPROACH

When an aircraft, under tower control, abandons the approach and coordination with approach control reveals no immediate space in the approach sequence, instruct the aircraft to change to approach control for sequencing.

7-79 VFR DEPARTURE INFORMATION

Inform departing VFR aircraft who request radar traffic advisories when to contact departure control and the frequency to use. After the departure is identified, provide traffic advisories in accordance with 2-21.

7-79 Note. — Departing aircraft desiring traffic information are expected to request the service and to state their proposed direction of flight upon initial contact with ground control

7-80 SERVICE PROVIDED WHEN TOWER IS INOPERATIVE

a. Provide the following services during hours when the tower is not in operation:

(1) Wind direction and velocity.

7-80a(1) Note. — Issue information provided from the FSS or WSO. Otherwise, inform the pilot that wind information is not available.

(2) Traffic information.

(3) Inform aircraft when radar service is terminated.

7-80a(3) Reference. — Radar Service Termination, 5-13.

b. Do not assign landing sequence.

7-81 thru 7-89 RESERVED

Section 8. STAGE III SERVICE — TERMINAL

7-90 APPLICATION

In addition to the basic services described in 7-60 and the Stage II services, apply Stage III procedures within the designated Terminal Radar Service Area (TRSA) or Terminal Control Area (TCA).

7-91 ISSUANCE OF EFC

When VFR aircraft are held either inside or outside the TRSA/TCA, inform the pilot when to expect further clearance.

7-92 SEPARATION

Any of the following may be applied within a TRSA/TCA:

7-92 Note 1. — Assignment of radar headings, routes, or altitudes is based on the provision that a pilot operating in accordance with VFR is expected to advise ATC if compliance will cause him to violate any FAR's.

7-92 Note 2. — Stage III separation and sequencing for VFR aircraft is dependent upon radar. When a radar outage occurs, efforts should be made to segregate VFR traffic from the IFR traffic flow.

a. Visual separation, as specified in 7-10, 7-31, and 7-76.

7-92a Note. — The provisions of 7-31d.(2) & (3) are applicable to Stage III operations.

7-92a Reference. — Glossary (Visual Separation).

b. *500 feet* vertical separation between VFR aircraft and between a VFR and an IFR aircraft.

7-92b Note. — 500 feet vertical separation shall not be applied below a heavy jet.

7-92b Reference. — Minima (Radar Separation), 5-72.

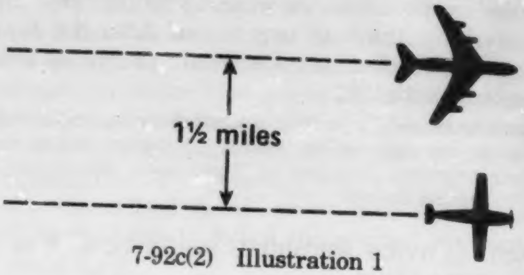
c. Within 15 miles of the radar antenna, separate helicopters and Category I and II VFR aircraft from:

7-92c Note. — This procedure DOES NOT apply between IFR aircraft.

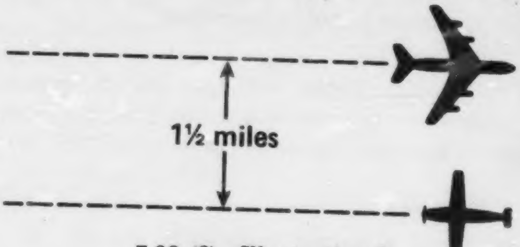
7-92c Reference — Aircraft Categories, 3-106a. Note.

(1) Other Category I or II VFR/IFR aircraft by a minimum of *1 ½ miles.*

(2) Category III VFR/IFR aircraft by *1 ½ miles* only when both aircraft are on parallel courses.



7-92c(2) Illustration 1



7-92c(2) Illustration 2

d. Within 1 mile of the runway end, ½ mile lateral separation between a helicopter and a fixed-wing aircraft/IFR helicopter on a straight-in approach or a straight-out departure.

7-92d Note. — This procedure applies when either of the two aircraft being separated is within 1 mile of the runway end.

7-92d Reference. — Glossary (Lateral Separation).

7-93 HELICOPTER TRAFFIC

Helicopters need not be separated from other helicopters. Traffic information shall be exchanged, as necessary.

7-94 ALTITUDE ASSIGNMENTS

a. Altitude information contained in a clearance, instruction, or advisory to VFR aircraft shall meet MVA, minimum safe altitude, or minimum IFR altitude criteria.

b. If required, issue altitude assignments, consistent with the provisions of FAR 91.79.

7-94b Note. — The minimum safe altitudes are (1) over congested areas, an altitude at least 1,000 feet above the highest obstacle, and (2) over other than congested areas, an altitude at least 500 feet above the surface.

7-94a Reference. — Flight Direction 4-40; Exceptions, 4-41; Minimum Enroute Altitudes, 4-44.

c. When necessary to assign an altitude for separation purposes to VFR aircraft contrary to FAR 91.109, advise the aircraft to resume altitudes

appropriate for the direction of flight when the altitude assignment is no longer needed for separation or when leaving the TCA or TRSA.

Phraseology:

RESUME APPROPRIATE VFR ALTITUDES.

7-95 APPROACH INTERVAL

The tower shall specify the approach interval

7-96 TRSA DEPARTURE INFORMATION

a. At controlled airports within the TRSA, inform a departing aircraft proposing to operate within the TRSA when to contact departure control and the frequency to use. If the aircraft is properly equipped, ground control or clearance delivery shall issue the appropriate beacon code.

7-96a Note. — Departing aircraft are assumed to want Stage III service unless the pilot states, "Negative Stage III," or makes a similar comment. Pilots are expected to inform the controller of intended destination and/or route of flight and altitude.

b. Provide separation until the aircraft leaves the TRSA.

c. Inform VFR participating aircraft when leaving the TRSA.

Phraseology:

LEAVING THE (name) TRSA *and, as appropriate,* RESUME OWN NAVIGATION, STAND BY FOR TRAFFIC ADVISORIES, RADAR SERVICES TERMINATED, SQUAWK ONE TWO ZERO ZERO, *etc.*

d. Aircraft departing satellite controlled airports that will penetrate the TRSA should be provided the same service as those aircraft departing the primary airport. Procedures for handling this situation shall be covered in a letter of agreement or facility directives, as appropriate.

e. Procedures for handling aircraft departing uncontrolled satellite airports must be advertised in a facility bulletin and service provided accordingly.

7-97 TCA METHODS

a. To the extent practical, clear large turbine-powered aircraft to/from the primary airport using altitudes and routes that avoid VFR corridors and airspace below the TCA floor where VFR aircraft are operating.

7-97a Note. — Pilots operating in accordance with VFR are expected to advise ATC if compliance with assigned altitudes, headings, or routes will cause any violation of FAR's.

b. Workload and traffic conditions permitting, approve/deny requests from VFR aircraft to operate in TCA's.

7-97b Examples. —

"Approved as requested. (Additional instructions, as necessary.)"

"Unable to approve clearance through TCA. (When necessary, reason and/or additional instructions.)"

"Cleared to Los Angeles airport. Enter TCA at three thousand five hundred, vicinity of Queen Mary."

"Cleared to enter TCA via direct Oakland VOR. Maintain four thousand five hundred while in TCA."

"Climb through TCA approved. Report leaving seven thousand."

c. Inform VFR aircraft when leaving the TCA.

Phraseology:

LEAVING THE (name) TCA *and, as appropriate,* RESUME OWN NAVIGATION, STAND BY FOR TRAFFIC ADVISORIES, RADAR SERVICE TERMINATED, SQUAWK ONE TWO ZERO ZERO, *etc.*

d. Vector aircraft to contain them in the TCA once they have entered it. If it is necessary to extend an aircraft's flight path outside the TCA for spacing, inform the aircraft when it leaves and reenters the TCA.

7-97d Note. — FAR 91.90 requires large, turbine-powered aircraft operating to or from the primary airport to operate at or above the designated floor of the TCA while within the lateral limits, unless otherwise authorized by ATC. Such authorization should be the exception rather than the rule.

TABLE OF CONTENTS

Chapter 8. SPECIAL FLIGHTS

Page

Section 1. GENERAL

8-1 General 8-1
8-2 Special Handling 8-1
8-3 Flight Check and SAFI Aircraft 8-1
8-4—8-9 Reserved 8-1

Section 2. SPECIAL INTEREST FLIGHTS

8-10 General 8-2
8-11 Application 8-2
8-12 Emergency or Unscheduled Landings 8-3
8-13—8-19 Reserved 8-3

Section 3. SPECIAL OPERATIONS

8-20 Aircraft Carrying Dangerous Materials 8-4
8-21 Celestial Navigation Training 8-4
8-22 Department of Energy (DOE) Special Flights 8-4
8-23 Experimental Aircraft Operations 8-4
8-24 FAA Research and Development Flights 8-5
8-25 Flynet 8-5
8-26 IFR Military Training Routes 8-5
8-27 Interceptor Operations 8-6
8-28 Law Enforcement Alerts 8-6
8-29 Military Aerial Refueling 8-6
8-30 Military Operations Above FL 600 8-7
8-31 Military Special Use Frequencies 8-8
8-32 Avoidance of Areas of Nuclear Radiation 8-8
8-33 SAC Evasive Action Maneuver 8-9
8-34 SAC Giant Lance Operations 8-9
8-35 SAC MITO Operations 8-9
8-36 SAMP 8-9
8-37 Snow Time 8-10
8-38 Special ATC Handling of SR71/YF12 Flights 8-10
8-39 Reserved 8-10

Section 4. SPECIAL USE AND ATC ASSIGNED AIRSPACE

8-40 Application 8-11
8-41 Separation Minima 8-11
8-42 VFR-On-Top 8-11
8-43 Avoidance 8-11
8-44—8-49 Reserved 8-12

Section 5. FUEL DUMPING

8-50 Information Requirements 8-13
8-51 Routing 8-13
8-52 Altitude Assignment 8-13
8-53 Separation Minima 8-13
8-54 Information Dissemination 8-13
8-55—8-59 Reserved 8-13

Section 6. JETTISONING OF EXTERNAL STORES

8-60 Jettisoning of External Stores 8-14

TABLE OF CONTENTS—Continued

Page
8-61—8-69 Reserved 8-14

Section 7. UNMANNED FREE BALLOONS

8-70 Application 8-15
8-71 Derelict Balloons 8-15
8-72—8-79 Reserved 8-16

Section 8. PARACHUTE JUMPING

8-80 Coordination 8-17
8-81 Positive Control Areas 8-17
8-82 Control Zones 8-17
8-83 Other Control Airspace 8-17

Chapter 8. SPECIAL FLIGHTS

Section 1. GENERAL

8-1 GENERAL

Provide aircraft engaged in the flight inspection of NAVAID's with maximum assistance. Unless otherwise agreed to, maintain direct contact with the pilot and exchange information regarding known traffic in the area and his intentions.

8-1 Note 1. — Many flight inspections are accomplished using automatic recording equipment, and an uninterrupted flight is necessary for successful completion of the mission. The workload for the limited number of aircraft engaged in these activities requires strict adherence to a schedule.

8-1 Note 2. — Flight inspection operations which require special participation of ground personnel, specific communications, or radar operation capabilities are considered to require special handling. These flights are coordinated with appropriate facilities before departure.

8-1 Reference. — Order 8200.1, U.S. Standard Flight Inspection Manual, and Order 8240.41, Flight Inspection/Air Traffic Coordination.

8-2 SPECIAL HANDLING

a. Clear the aircraft according to pilot request as soon as practicable. Do not ask the pilot to deviate from his planned action except to preclude an emergency situation.

8-2a Reference. — Order 8240.41, Flight Inspection/Air Traffic Coordination, Appendix 1 (Flight Inspection Binder), describes certain flight inspection maneuvers in detail.

b. Issue radar advisories to the flight inspection aircraft where adequate coverage exists and to the extent permitted by workload.

c. Suggest flight path adjustments, as required, for any aircraft which will enter or penetrate an area in which a flight inspection function is being performed.

d. Provide special handling, as required, to FAA aircraft conducting flight inspections using the call sign "Flight Check." The call sign "Flight Check (Nr) recorded" indicates automated flight inspections are in progress in terminal areas.

8-2d Note. — FAA flight inspection aircraft will file flight plans using the call sign "Flight Check" during flight inspections or when inbound to conduct flight inspections. Flight plan remarks may indicate type NAVAID inspection to be accomplished; e.g. "FC OKC P."

8-3 FLIGHT CHECK AND SAFI AIRCRAFT

a. Provide special handling, as required, to expedite flight inspection of NAVAID's by Flight Check and SAFI aircraft equipped with airborne computers.

8-3a Note. — Preplanned automatic flight places the following limitations on the capability of the pilot to adhere to normal ATC clearances:

a. Route of flight — Normally requires 40 to 80 nautical miles square, and the route is planned along the grid lines irrespective of any airway structures.

b. Altitude assignment — Normally flights will be accomplished at 10,000, 15,000, or FL200. The crew can compensate for altitude changes not in excess of 2,000 feet, if necessary. For example, the pilot files 15,000; he can accept any altitude from 13,000 to 17,000.

c. En route holding — Holding is required at each turning point in the flight plan before the flight can continue on the next grid line track. The direction and duration of holding will be included in the flight plan and in the position report made on arrival over the holding point.

d. Position reporting — Standard position reporting format will be used, except that the fix code name will be used in lieu of the facility radial and distance during grid positions of flight.

8-3a Reference. — Operational Priority, 2-4c.

b. Avoid changes in the route or altitude from that filed by the pilot in the initial flight plan.

c. Do not impose air traffic control delays in excess of holding times specified in the flight plan except to preclude emergency situations.

d. Do not change the previously assigned discrete beacon code of special radar accuracy flight check aircraft.

8-3d Reference. — Order 7210.3 — 902, Special Radar Accuracy Checks; 1243, ASR Performance Checks.

8-4 thru 8-9 RESERVED

Section 2. SPECIAL INTEREST FLIGHTS

8-10 GENERAL

EN ROUTE

a. All flight movement data on the aircraft listed in (1) and (2) below shall be immediately brought to the attention of the area manager and forwarded by the most expeditious means (voice, if possible) to the Senior Director at the concerned NORAD Region Control Center and to Central Flow Control Function of the ATCCC (AAT-440). Voice messages will be followed up with a teletypewriter message when directed. All flight plans on aircraft listed in (1) and (2) below, including flights within the Continental U.S., shall be retransmitted by teletypewriter to AAT-440 and the Office of International Aviation Affairs, Attention: AIA-132.

8-10a Note 1. — All flight movement data includes flight plans and changes thereto such as changes from IFR to VFR, reroutes or route deviations authorized or directed by the facility, departure messages, arrival messages, unauthorized route deviations or any other unusual operations, etc.

8-10a Note 2. — These procedures are in addition to the AMIS procedures contained in Handbook 7610.4, Part 2.

8-10a Note 3. — Communist-controlled countries include Albania, Bulgaria, Cambodia, Peoples Republic of China, Cuba, Czechoslovakia, East Germany, Hungary, North Korea, Outer Mongolia, Poland, Romania, The Union of Soviet Socialist Republics, and Socialist Republic of Vietnam.

8-10a Note 4. — The concerned NORAD Region is the one to whom SCATANA reports are forwarded consistent with local ARTCC/NORAD Region SCATANA reporting procedures.

8-10a Note 5. — All Continental U.S. facilities have either direct flow control interphone circuits or can reach AAT-440 by Autovon (851-1971) or telephone number (202) 426-3797.

(1) All known aircraft of Cuban registry and all known civil aircraft of other communist-controlled countries that will enter, overfly, or operate within the Continental United States, the Atlantic, Gulf of Mexico or Pacific Coastal ADIZ's, or the Southern Border Domestic ADIZ.

8-10a(1) Reference. — Glossary (Continental United States).

(2) All known civil aircraft of foreign registry (other than the aircraft in (1), above that will enter or overfly the Continental United States enroute to or from Cuba.

b. Advance route information which has been cleared by NORAD and coordinated by AIA-132 with the State Department, as necessary, will be passed to the concerned ARTCC's by AIA-132 via AAT-440. Inform AAT-440 of your concurrence or problems with the route, as the case may be. AAT-440 will relay any problems to AIA-132 for resolution with NORAD. Advance route information does not constitute the forwarding of flight movement data to NORAD as specified in a. above.

8-11 APPLICATION

EN ROUTE

a. Comply with any operational request that may be received directly from NORAD or through AAT-440 unless the change will affect flight safety. When safety is a factor, acquaint NORAD with the situation and attempt to work out an alternate solution if time and circumstances permit. If unable, take the course of action dictated by flight safety considerations and inform NORAD and AAT-440 as quickly as possible thereafter. Comply with requests for information or assistance from NORAD or the State Department which may include relay of messages to facilities or an aircraft in flight.

8-11a Note. — State Department communications will be relayed through AAT-440.

b. Request the aircraft to return to its approved route/reroute of flight whenever any deviation is noted.

c. Immediately alert the area manager and notify the Senior Director at the concerned NORAD Region Control Center and AAT-440 via the most expeditious means when the following conditions occur:

(1) The aircraft refuses to comply with a NORAD or State Department message.

(2) Communication with the aircraft is established but the aircraft's identification cannot be immediately correlated with a known flight plan. Attempt flight plan correlation when time permits.

(3) The aircraft deviates from its approved route of flight and refuses to return to it when so requested.

(4) The aircraft refuses a reroute when so cleared or deviates from its reroute and refuses to return to it when requested.

(5) A departure message on a flight plan of an aircraft in 8-10a(1), originating in Canada, Mexico, or Cuba is not received within 5 minutes after the proposed time and you are unable to ascertain if the aircraft has departed either IFR or VFR.

d. If NORAD dispatches aircraft to intercept and escort the flight, the control procedures in 7610.4, Part 6 shall apply.

8-12 EMERGENCY OR UNSCHEDULED LANDINGS

a. If an aircraft of a communist-controlled country makes an emergency or unscheduled landing in the United States, immediately alert the AM/controller-in-charge of the shift and notify:

(1) *EN ROUTE:* In the Continental United States —

(a) The Senior Director at the concerned NORAD Region Control Center.

(b) AAT-440.

8-12a Note. — AAT-440 will relay or voice-patch the information to all FAA Washington Headquarters organizations concerned.

(c) U.S. Customs Service Office for the airport where the aircraft will land.

(2) *EN ROUTE:* In the Pacific Region, Puerto Rico, and the Virgin Islands — The Air Defense Control Center and the offices specified in a(1)(b) and a(1)(c).

8-12a(2) Note. — Guam CERAP forwards the information through the Honolulu ARTCC.

(3) *EN ROUTE:* In the Alaskan Region — The Alaskan NORAD Region Control Center and the offices specified in a(1)(b) and a(1)(c).

(4) *TERMINAL:* The nearest U.S. Customs Service Office and the appropriate ARTCC.

b. Provide the following information to the organizations specified in a(1), (2), (3), and (4) above if available:

(1) Type of aircraft.

(2) Country of aircraft registry.

(3) Destination airport.

(4) Nature of emergency or reason for landing, as appropriate.

c. Advise the pilot that passengers must remain aboard the aircraft after landing until cleared by the U.S. Customs Service Office.

d. *TERMINAL:* In cases where communication is established with the aircraft but the aircraft identification cannot be immediately correlated with a known flight plan, notify the appropriate ARTCC and nearest U.S. Customs Service Office.

8-13 thru 8-19 RESERVED

Section 3. SPECIAL OPERATIONS

8-20 AIRCRAFT CARRYING DANGEROUS MATERIALS

a. Provide the following special handling to military aircraft or military contracted aircraft carrying dangerous materials when:

(1) The words "Dangerous Cargo," or "Inert Devices," or both are contained in the remarks section of the filed flight plan , or

8-20a(1) Note 1. — Certain types of military flights carrying dangerous materials require strict adherence to military regulations and flight planning along carefully selected routes. These flights must avoid heavily populated areas.

8-20a(1) Note 2. — "Inert Devices" are devices containing no dangerous materials but closely resembling nuclear or explosive items that are classified as dangerous and could be easily mistaken for their dangerous counterparts.

(2) The pilot uses these words in radio communication.

b. If it becomes necessary to issue a clearance to amend the route/altitude, advise the pilot:

(1) Of the proposed change, and

(2) The amount of delay to expect if it is necessary to maintain the present route/altitude.

c. When it becomes necessary for the pilot to refuse a clearance amending his route/altitude, he will advise if the traffic delay is acceptable or if an alternate route/altitude is desired. In such cases, offer all possible assistance.

d. When the aircraft is provided an en route descent, do not vector the aircraft from the planned route unless the pilot concurs.

e. Use special patterns and routings in areas where they have been developed for these flights. If special patterns and routings have not been developed, employ normal procedures.

8-21 CELESTIAL NAVIGATION TRAINING

EN ROUTE

a. Approve flight plans specifying celestial navigation only when it is requested for USAF or USN aircraft.

8-21a Note. — An ATC clearance must be obtained by the pilot before discontinuing conventional navigation to begin celestial navigation training. The pilot will advise when discontinuing celestial navigation and resuming conventional navigation. Celestial navigation training will be conducted within 30 NM of the route centerline specified in the en route clearance unless otherwise authorized by ATC. During celestial navigation training, the pilot will advise ATC before initiating any heading changes which exceed 20 degrees.

b. Within Conterminous U.S. airspace, limit celestial navigation training to transponder-equipped aircraft within areas of ARTCC radar coverage.

c. Prior to control transfer, insure that the receiving controller is informed of the nature of the celestial navigation training leg.

8-22 DEPARTMENT OF ENERGY (DOE) SPECIAL FLIGHTS

a. Provide notification of possible route or altitude changes as far in advance as possible for "RAC" flights. The pilot will indicate if the proposed change is acceptable or if alternate routing or altitude will be requested.

8-22a Note. — DOE contracts for civil pilots to operate public aircraft to transport radioactive or high explosive materials within the Conterminous U.S. These flights operate on an IFR flight plan but principally during daylight hours and VFR conditions. These flights require flight along carefully selected routes and, in some instances, pilots will refuse clearances that require reroute or altitude changes that would derogate their objective.

b. *EN ROUTE:* Approve pilot requests to leave center frequency for operational purposes as traffic conditions permit.

c. If you receive information that a "RAC" aircraft is involved in an accident, secure as much information as possible, particularly with respect to location, and immediately notify the ARTCC AM.

8-22c Note. — There is a possibility of an explosive or radiation hazard of an "RAC" aircraft involved in an accident.

8-23 EXPERIMENTAL AIRCRAFT OPERATIONS

TERMINAL

a. When notified that an experimental aircraft intends to land or depart, take the following action:

8-23a Note. — FAR 91.42(d)(3) requires that each person operating an aircraft with an experimental certificate shall notify the control tower of the experimental nature of the aircraft when operating into or out of airports with operating control towers.

(1) If notified of any special handling requirements, clear the aircraft according to pilot requests as traffic permits and if not contrary to ATC procedures.

(2) Once approved, do not ask the pilot to deviate from his planned action except to preclude an emergency situation.

b. At locations where volume or complexity of experimental aircraft operations warrant, a letter of agreement may be consummated between the facility and operator.

8-24 FAA RESEARCH AND DEVELOPMENT FLIGHTS

When coordinated in advance and traffic permits, approve requests for special flight procedures from aircraft participating in FAA research and development test activities. These special procedures shall be applied to participating aircraft/vehicles.

8-24 Note. — Special flight procedures for FAA research and development test activities must be approved by the facility air traffic manager prior to their use.

8-24 Reference. — Order 7210.3-624, Research and Development Flights.

8-25 FLYNET

Provide expeditious handling for civil or military aircraft using the code name "Flynet." Relay the code name as an element in the remarks position of the flight plan.

8-25 Note. — The code name "Flynet" indicates that an aircraft is transporting a Nuclear Emergency Team or a Disaster Control Team to the location of a nuclear accident or a major accident involving chemical agents or biological research materials. It is in the public interest that they reach their destination as rapidly as possible

8-25 Reference. — Order 7610.4-1522.

8-26. IFR MILITARY TRAINING ROUTES

a. Except for aircraft operating in the same altitude reservation, clear aircraft into an MTR provided separation will be applied between successive aircraft unless otherwise covered in a letter of agreement between the military scheduling activity and the concerned ATC facility.

Phraseology:

CLEARED INTO IR (designator).

MAINTAIN (altitude),

or

MAINTAIN IR (designator) ALTITUDE/S,

or

MAINTAIN AT OR BELOW (altitude),

or

CRUISE (altitude),

and, if required,

CROSS (fix) AT OR LATER THAN (time).

b. Unless otherwise covered in a letter of agreement between the military scheduling activity and the concerned FAA facility, clear aircraft to exit an MTR.

Phraseology:

CLEARED TO (destination/clearance limit) FROM IR (designator/exit fix) VIA (route). MAINTAIN (altitude).

c. If the provisions of a above cannot be accomplished, MTR's may be designated for MARSA operations. To preclude an inadvertent compromise of MARSA standards by ATC, appropriate MARSA application for such routes shall be covered in a letter of agreement with the military scheduling activity. Establish separation between aircraft as soon as practicable after operation on the designated MARSA route is ended.

8-26c Note. — For designated MARSA routes, the military assumes responsibility for separation for MTR aircraft that have passed the primary/alternate entry fix until separation is established by ATC after operations on the MARSA route are completed.

d. The lateral airspace to be protected along an MTR is the designated width of the route.

e. Prior to an aircraft entering an MTR, request the pilot's estimate for the route's exit/alternate exit fix, his requested altitude after exiting, and, if applicable, the number of reentries on a Strategic Training Range (STR).

Phraseology:

(Call sign) CONFIRM YOUR EXIT FIX ESTIMATE AND REQUESTED ALTITUDE AFTER EXIT AND, *if applicable,* THE NUMBER OF REENTRIES.

f. Forward estimates for exit/alternate exit fixes, requested altitude after exit, and, if applicable, the number of reentries on the STR.

g. Apply the procedures of 6-2, Nonreceipt of Position Report, based upon the pilot's estimate for the route exit fix.

h. Clearance may be issued to amend or restrict operations on a route for ATC considerations. Where a route has been designated MARSA in accordance with c above, ATC shall not amend or restrict operations in such a manner as to compromise MARSA provisions.

8-26h Note. — When MARSA is provided through route scheduling and circumstances prevent the pilot from entering the route within established time limits, it shall be the responsibility of the pilot to inform the ATC facility and advise his intentions.

i. If an aircraft on an IR experiences a two-way radio communications failure and you are unable to determine the aircraft is proceeding VFR in accordance with FAR 91.127(b) or the aircraft has not been positively radar identified:

(1) Provide separation to the destination airport based on the aircraft complying with the following:

(a) Maintain to the exit/alternate exit fix the higher of the following altitudes:

(i) The minimum IFR altitude for each of the remaining route segment/s remaining on the route.

(ii) The highest altitude assigned in the last ATC clearance.

(b) Depart the exit/alternate exit fix at the appropriate altitude specified in (a) above then climb/descend to the altitude filed in the flight plan for the remainder of the flight, or

8-26l(1)(b) Note. — In the even of a two-way communications failure, ATC will be based on the following anticipated pilot action at the exit fix. Unless otherwise covered in a letter of agreement, and if the pilot is unable to comply with the VFR provisions of FAR 91.127/FLIP IFR Supplement, the pilot will exercise his emergency authority, squawk transponder Code 7700, depart the exit/alternate exit fix and climb/descend (continuing to squawk 7700) to the altitude filed in the flight plan. Subsequent transponder operations will be in accordance with paragraph 9-43. Air traffic controller action from the exit fix is as prescribed in paragraph 9-1.

(c) Proceed in accordance with the lost communication procedure contained in Letters of Agreement.

(2) Continue to monitor the last ATC assigned discrete code.

8-26l(2) Note. — Pilots who experience a two-way radio failure will adjust their transponder to Code 7700 during climb/descent to altitude filed for the next leg of the flight plan; then change to Code 7600 for a period of 15 minutes. At the end of each 15-minute period, he will squawk 7700 for a period of 1 minute; all other times he will squawk 7600.

8-27 INTERCEPTOR OPERATIONS

Provide service to military interceptor aircraft in accordance with the policies and procedures in 7610.4, Special Military Operations, Part 6.

8-27 Note. — The FAA and the military have mutually agreed to the implementation of policies and procedures for control of air defense interceptor operations. Effective coordination and cooperation between FAA and the military at all levels are essential if policy objectives are to be met.

8-28 LAW ENFORCEMENT ALERTS

a. Alerts shall not be distributed outside FAA except at non-FSS airports. At those locations, confine your search for information to airport offices and air carriers.

8-28a Reference. — Order 1600.29B, Law Enforcement Alert Message System. Order 7210.3-256, Cooperation with Law Enforcement Agencies.

b. Upon receipt of knowledge concerning an aircraft for which a current law enforcement alert message is held, do the following:

(1) Forward any information on the aircraft to the originating FSS and the requester when specified in the message.

(2) Immediately notify the cognizant Air Transportation Security Division/Staff by the most rapid means.

(3) DO NOT TAKE ANY OTHER ACTION AFFECTING THE AIRCRAFT, CARGO, CREW, OR PASSENGERS NOT NORMALLY RELATED TO JOB RESPONSIBILITIES.

8-29 MILITARY AERIAL REFUELING

EN ROUTE

Authorize aircraft to conduct aerial refueling along published or special tracks at their flight plan altitude, unless otherwise requested.

Phraseology:

CLEARED TO CONDUCT REFUELING:

ALONG (number) TRACK,

or

FROM (fix) TO (fix),

and

MAINTAIN REFUELING LEVEL (altitude),

or

MAINTAIN (altitude),

or

COMMENCING AT (altitude), DESCENDING TO (altitude).

8-29 Note 1. — During aerial refueling, tanker aircraft are responsible for receiver aircraft communication with ATC and for their navigation along the track.

8-29 Note 2. — Aerial refueling airspace is not sterilized airspace and other aircraft may transit this airspace provided vertical or lateral separation is provided from refueling aircraft.

8-29 Note 3. — MARSA begins between the tanker and receiver when they tanker and receiver/s have entered the air refueling airspace and the tanker advises ATC that he is accepting MARSA.

8-29 Note 4. — MARSA ends between the tanker and receiver when the tanker advises ATC that the tanker and receiver aircraft are vertically positioned within the air refueling airspace and ATC advises MARSA is terminated.

8-29 Reference. — Use of MARSA, 2-11; Formation Flight Aircraft and Other Aircraft, 5-74. Order 7610.4, Part 8, Aerial Refueling.

a. Do not request receiver aircraft that have been cleared to conduct air refueling and have departed the ARIP to:

(1) Make code changes when less than 5 miles from the tanker.

(2) Squawk Standby when less than 1 mile or more than 3 miles from the tanker.

8-29a Note. — Requests for receiver aircraft to make code changes during air refueling diverts the receiver pilot's attention during a critical phase of flight.

b. When issuing an initial air refueling clearance, you may request a receiver to squawk standby when the receiver reaches a point 3 miles from the tanker.

8-29b Note 1. — Receiver aircraft will squawk normal when separation from the tanker is greater than 3 miles.

8-29b Note 2. — Once rendezvous is completed, heading and altitude assignments may be made with the tanker concurrence with MARSA remaining in effect.

8-29b Note 3. — Upon rendezvous completion, the tanker shall keep receiver aircraft within 3 miles of the tanker until MARSA is terminated.

c. After MARSA has been declared, you should avoid issuing course or altitude changes prior to rendezvous.

8-29c Note. — Altitude or course changes issued will automatically void MARSA.

d. Do not use the altitude vacated during the refueling operation until the refueling aircraft has reported reaching the next IFR altitude.

8-29d Reference. — Exceptions, 6-52.

e. Approve requests by the tanker pilot for vectors or alternative routes or altitudes as follows:

(1) Furnish vectors or alternative altitudes at any time.

(2) Furnish nonradar routes only after the refueling aircraft have passed the ARCP.

8-29e Note 1. — To meet a training requirement that aerial refueling be accomplished in a nonradar environment, the military has requested that vectors be furnished only upon request.

8-29e Note 2. — The tanker commander is responsible for coordinating all in-flight requests with other aircraft in the refueling mission before submission of such requests to the center.

8-29e Note 3. — Normally, aircraft conducting aerial refueling operations will utilize at least three consecutive altitudes. However, then possible, four consecutive altitudes should be provided for fighter-type aircraft. (See Order 7610.4-1066.)

f. Unless a vector or alternative route has been furnished, clear the aircraft to depart the refueling track at a navigational reference point or egress fix.

g. Request an aircraft to report the ARIP, ARCP, or egress fix, as necessary.

Phraseology:

REPORT:

A-R-I-P,

or

A-R-C-P

or

EGRESS FIX.

h. R-71/F-12 aircraft refueling is conducted at normal refueling FL's in special established tracks. The track numbers will be included in the flight plan and in the remarks section of the tanker aircraft's flight plan. The tanker will advise the appropriate ARTCC the type of orbit required. Additionally, with pilot concurrence, the tanker may be cleared to hold at other than the required altitude until redezvous operations begin.

i. Aerial refueling rendezvous by R-71/F-12 aircraft may be accomplished through the use of special equipment which may result in unacceptable noise to some UHF communication frequencies affecting ATC services. If this occurs, advise the tanker aircraft to suppress the noise.

Phraseology:

(Identification) STOP NOISE.

j. Alternate airports for R-71/F-12 aircraft, in the event of missed aerial refueling, will be designated in advance of the flight. Current weather for the designated airports should be readily available for relay to the pilot.

8-30 MILITARY OPERATIONS ABOVE FL 600

EN ROUTE

Control aircraft operating above FL 600 using the following procedures:

a. Flight plans involving supersonic flight are required 16 hours in advance of proposed departure times for processing and approval by the ARTCC's concerned. The originating ARTCC, where the flight plan is first filed, may waive the 16 hour advance filing requirement.

b. The route of flight shall be defined by at least one high altitude fix within each ARTCC area without regard to the distance between fixes. Additionally, the entry and exit points of turns of 90 degrees or more will be designated.

c. Elapsed times from takeoff to the first fix in each ARTCC area shall be included in the route of flight.

d. The ARTCC which originates the flight plan shall forward departure times to all ARTCC's responsible for processing the flight plan.

e. Approval of the flight plan indicates approval of both route and FL's (if stated) including operations below FL 600 (aerial refueling).

Phraseology:

CLEARED AS FILED VIA ROUTE AND FLIGHT LEVELS.

8-30e Reference. — Military Aerial Refueling, 8-29.

f. Separation. Use the following as minima in lieu of the corresponding type of separation prescribed in:

8-30f Note. — The primary method described to provide separation between two supersonic aircraft is to descend the aircraft at the lower FL and provide vertical separation since the aircraft at the higher FL may not be able to climb rapidly enough to establish the required separation. Another aspect which should be considered is that supersonic aircraft during turns, either programmed or as the result of vectors, will lose a few thousand feet. Vectoring supersonic aircraft seriously affects the range and mission objectives. Radar separation is the preferred method of separating a subsonic aircraft both from another subsonic aircraft or from a supersonic aircraft.

(1) 6-51, Minima Between Altitudes — *5,000 feet.*

8-30f(1) Note 1. — The security requirements of the military services preclude the transmission of actual altitude information on the air/ground or landline circuits. A classified document detailing the plan for ascertaining altitude codes for the day should be readily available to the controllers at their positions of operation.

8-30f(1) Note 2. — Pilots will report their altitude, using the coded plan, and intended flight profile on initial contact with each ARTCC.

(2) 6-43, Minima Along Other Than Established Airways or Routes — Protect the airspace 25 miles either side of the route centerline. For turns by supersonic aircraft, protect the airspace 75 miles on the overflown side and 25 miles on the other side. For turns by subsonic aircraft, protect the airspace 34 miles on the overflown side and 25 miles on the other side.

g. A deviation to 5-51, Primary Radar Identification Methods, and 5-52, Beacon Identification Methods, is authorized for R-71/F-12 aircraft operating supersonically where positive identification is apparent because of the high speed target definition and the relatively small number of aircraft involved.

8-31 MILITARY SPECIAL USE FREQUENCIES

EN ROUTE

a. Assign special use frequency to:

8-31a Note. — Special use frequencies are assigned to ARTCC's in such a manner that adjacent ARTCC's will not have the same frequency. They are to be used within the ARTCC area jurisdiction from the established FL base of the high altitude sectors and above. Each high altitude sector should have the capability to use the special use frequency on a shared basis.

(1) USAF Tactical Air Command (TAC), U.S. Navy, and Air National Guard (ANG) single-pilot jet aircraft formations operating at night or in instrument weather conditions. Formations of five or more USAF TAC aircraft deploying either to a Continental U.S. staging base or nonstop to an overseas location are authorized to use special use frequencies at any time. Normally these deployments will be conducted within an altitude reservation.

(2) R-71/F-12, U-2 and B-57 (pressure suit flights) aircraft at all altitudes/FL's except where terminal operations require the assignment of other frequencies.

8-31a(2) Note. — Aerial refueling operations may require that aircraft leave the special use frequency for communications with the tanker. This will occur when the receiver is approximately 200 miles from the ARCP. The tanker aircraft will remain on the ARTCC assigned frequency and will relay clearances to the receiver as required. An alternate means of communications between the tanker and receiver is HF radio.

(3) All aircraft during supersonic flight.

8-31a(2) and (3) Note. — Pilots are expected to request assignment of the special use frequency in the remarks section of the flight plan or before entering supersonic flight. B-57 aircraft engaged in pressure suit operations will use the static call sign KITE and flights will normally be conducted from Dover, Eielson, Ellington, Hickman, Howard, Kirtland and McClellan Air Force Bases.

(4) E-3A mission area Dragnet when operations are being conducted as an MRU.

b. The special use frequency may be assigned as "backup" for the high-altitude sector when direct communications are essential because of a potential emergency control situation.

c. Do not assign the special use frequency to the aircraft in a(1) when they will operate in airspace assigned for special military operations.

8-32 AVOIDANCE OF AREAS OF NUCLEAR RADIATION

a. Advise pilots whenever their proposed flight path will traverse a reported or forecasted area of hazardous radiation and reroute the aircraft when requested by the pilot.

8-32a Reference. — Order 7610.4-26, Avoid Hazardous Radiation Areas.

b. Inform pilots when an airfield of intended landing lies within a reported or forecasted area of hazardous radiation and request the pilot to advise his intentions.

8-33 SAC EVASIVE ACTION MANEUVER

EN ROUTE

Approve a pilot request to conduct a SAC Evasive Action maneuver only on the basis of a permissible traffic situation. Specify the following items, as necessary, when issuing approval:

8-33 Note. — The SAC "Evasive Action" maneuver is performed by SAC bomber/fighter bomber aircraft at or above FL 250 along a 60 NM long segment of the flight plan route overlying a RBS or other site and includes:

a. Flying a zigzag pattern on both the left and right side of the flight plan route centerline. Altitude deviations are made in conjunction with the lateral maneuvering.

b. Lateral deviations from the route centerline will not normally exceed 12 miles. Altitude variations shall not exceed plus or minus 1,000 feet of the assigned flight level (i.e., confined within a 2,000 foot block).

a. Specific route segment on which the maneuver will take place.

b. Distance of maximum route deviation from the centerline in miles.

c. Altitude.

Phraseology:

CLEARED TO CONDUCT EVASIVE ACTION MANEUVER FROM (fix) TO (fix),

and

(number of miles) EITHER SIDE OF CENTERLINE,

and

MAINTAIN (altitude) THROUGH (altitude),

and

COMPLETE MANEUVER AT (fix) AT (altitude).

8-34 SAC GIANT LANCE OPERATIONS

EN ROUTE

Provide the following to Giant Lance flights at all times when aircraft are within radar coverage:

8-34 Note. — SAC has a continuing requirement to conduct Giant Lance flights under peacetime conditions. These flights shall be identified by CARF notification to activate prepositioned Giant Lance ALTRV's. Since the number and status of Giant Lance flights may vary with emergency readiness conditions, CARF will inform all concerned ARTCC's of the current Giant Lance ALTRV in effect and any changes thereto.

a. Radar flight following.

b. Traffic information, except when operating in positive controlled airspace.

c. Advisory information whenever two or more Giant Lance aircraft are observed with less than 15 miles separation except when a rendezvous or cell formation flight is in progress.

d. Close adherence to preplanned routes except for routine changes requested by the pilot.

8-35 SAC MITO OPERATIONS

a. Control MITO operations on the basis that MARSA is applicable between MITO aircraft until approved separation is established by the aircraft and acknowledged for by ATC.

8-35a Note 1. — ATC is not responsible for providing separation during any portion of a MITO operation for which VFR flight has been requested and approved.

8-35a Note 2. — A MITO operation begins at the takeoff roll and ends at a designated fix or cruising altitude. Use of these procedures does not authorize priority handling of these aircraft.

b. *TERMINAL:* Provide aircraft with at least the requested takeoff interval between departures as specified in a letter of agreement covering the MITO operation.

c. *TERMINAL:* Issue takeoff clearance on the departure frequency established in accordance with one of the following in the order listed:

(1) Discrete frequency common to both tower and RAPCON.

(2) RAPCON frequency if the tower has "override" capability.

(3) If neither of the preceding exists, tower frequency until airborne and changed to RAPCON.

d. Clear aircraft which will use MITO procedures, then fly in formation en route, to the breakup fix as the clearance limit.

e. Forward data pertaining to altitude or route beyond the breakup point to the center concerned as a part of the routine flight plan information.

f. *EN ROUTE:* If the breakup occurs in your area, issue an appropriate clearance to authorize transition from formation to individual route or altitude or to continue flight as a formation by the route filed by the lead aircraft until such time as breakup may be approved.

8-36 SAMP

Provide special handling to USAF aircraft engaged in aerial sampling missions (atmospheric sampling for nuclear contamination). Honor inflight clearance requests for altitude and route changes to the maximum extent possible. Other IFR aircraft may be recleared so that requests by SAMPLER aircraft are honored. Separation standards as outlined in this handbook shall be applied in all cases.

8-36 Reference. — Operational Priority, 2-4; Aircraft Identification, 2-86. Order 7210.3 — 633, Atmospheric Sampling for Nuclear Contamination.

8-37 SNOW TIME

Whenever a SNOW TIME ECM exercise causes the primary radar display to become unusable, take the following actions, as appropriate:

8-37 Note. — SNOW TIME exercises are large-scale electronic countermeasures (ECM) missions designed to satisfy training requirements of the U.S. military forces. The "Faker Force" aircraft are operated on an ALTRV basis along tracks established for the purpose.

8-37 Reference. — ECM/ECCM Activity, 5-5.

a. Provide radar service to the extent possible.

b. Use only secondary radar, if required, and apply radar separation only between positively identified aircraft.

c. Apply nonradar separation between all aircraft not positively identified on radar.

d. Implement "Stop Buzzer" only when aircraft safety will be compromised.

e. Curtail radar services if necessary to permit the SNOW TIME ECM exercise to continue.

8-38 SPECIAL ATC HANDLING OF SR71/YF12 FLIGHTS

a. Provide special handling to SR71/YF12 type aircraft during climb and descent profiles.

8-38a Note. — After completing aerial refueling and clearance to climb above FL 600 is received, these aircraft will climb subsonic to approximately FL 330 then accelerate in a shallow dive to approximately FL 290; the aircraft will then reinitiate an uninterrupted climb. This maneuver is called a "dipsy doodle." It may be necessary for the pilot to perform a "dipsy doodle" even though cleared to an interim altitude below FL 600. Controllers should be alert to this maneuver when applying vertical separation procedures involving these aircraft. A delay in clearance to climb after refueling or an intermediate level off below FL 600 results in tremendous fuel consumption.

b. Honor in-flight requests for altitudes and route changes to the extent possible.

c. To the extent possible, do not change the assigned beacon code.

d. Do not impose ATC delays for SR71/YF12 aircraft except to preclude an emergency situation.

8-39 RESERVED

Section 4. SPECIAL USE AND ATC ASSIGNED AIRSPACE

8-40 APPLICATION

Apply the procedures in this section to aircraft operating in proximity to special use or ATC assigned airspace (ATCAA) unless the airspace is designated an Alert Area/Controlled Firing Area or one of the following conditions exist:

8-40 Note. — These procedures are not applicable to Alert Areas or Controlled Firing Areas. See Glossary (Special Use Airspace).

a. The pilot informs you that permission has been obtained from the using agency to operate in the airspace.

b. The using agency informs you they have given permission for the aircraft to operate in the airspace.

8-40b Note. — Using agency permission may be relayed to the pilot.

c. The Restricted/Warning Area, MOA, or ATCAA has been released to the controlling agency.

d. The aircraft is on an approved ALTRV, unless the airspace area in question is an ATCAA.

8-40d Note. — Mission project officers are responsible for obtaining approval for ALTRV operations within Prohibited/Restricted/Warning Areas and MOA's.

8-41 SEPARATION MINIMA

Separate nonparticipating aircraft from the upper/lower limits of active special use airspace and ATCAA by the following minima:

a. Prohibited/Restricted/Warning Area, MOA, or ATCAA — Assign an altitude consistent with 4-40, 4-41, and 4-42, which is at least 500 feet (above FL 290 — 1,000 feet) above/below the upper/lower limit, unless 8-41b. below applies.

b. Some Prohibited/Restricted Areas are established for security reasons or to contain hazardous activities not involving aircraft operations. Nonparticipating aircraft may be assigned any appropriate altitude above or below these Prohibited/Restricted Areas, provided the areas have been identified by facility management.

8-41b Reference. — Order 7210.3-214.

c. Prohibited Area — Clear aircraft on airways or routes whose widths or protected airspace do not overlap the peripheral boundary.

d. Restricted/Warning Area/MOA/ATCAA — Clear aircraft in accordance with 8-41c. above, unless clearance of nonparticipating aircraft in/through the area is provided for in a letter of agreement.

e. Prohibited/Restricted/Warning Area, MOA, or ATCAA — *3 miles* (En Route Stage A/DARC, FL 600 and above — *6 miles*), unless clearances of nonparticipating aircraft in/through/adjacent the area is provided for in a letter of agreement/facility directive.

f. Exception. Some Prohibited/Restricted Areas are established for security reasons or to contain hazardous activities not involving aircraft operations. The above minima for these Prohibited/Restricted Areas is not required if the areas have been identified by facility management. When separation minima is not required, vector aircraft to avoid the airspace.

8-41c(2) Reference. — Order 7210.3 — 214.

8-42 VFR-ON-TOP

If the aircraft's route, track, or altitude may cause it to enter an active Prohibited/Restricted/Warning Area, MOA, or ATCAA:

a. Inform the pilot to conduct flight "VFR-on-top" at least 500 feet (FL 290 and above — 1,000 feet) above the upper limit or below the lower limit of the airspace (subject to 7-20); or

Phraseology:

MAINTAIN VFR-ON-TOP AT LEAST 500 FEET (FL290 and above — 1,000 FEET) ABOVE/BELOW (upper/lower limit of airspace) ACROSS (name or number of airspace) BETWEEN (fix) AND (fix); *and, if the airspace is an ATCAA,* (name of ATCAA) IS ATC ASSIGNED AIRSPACE.

b. Clear the aircraft via a routing which provides approved separation from the airspace.

c. *Exception.* Some Prohibited/Restricted Areas are established for security reasons or to contain hazardous activities not involving aircraft operations. The addition of 500 (or 1,000) feet to the upper/lower limit of these Prohibited/Restricted Areas is not required if the areas have been identified by facility management.

8-42 Reference. — Order 7210.3 — 214.

8-43 AVOIDANCE

Take the following action of a nonparticipating aircraft's route or track will cause it to enter special use or ATC assigned airspace and 8-40a., b., c., or d., above do not apply:

8-43 Note. — Nonparticipating aircraft refers to those aircraft for which you have separation responsibility and which have not been authorized by the using agency to operate in/through the special use airspace or ATCAA in question.

a. For Prohibited/Restricted/Warning Areas — Clear nonparticipating aircraft via routing which will provide approved separation from the airspace, unless clearance of nonparticipating aircraft in/through the area is provided for in a memorandum/letter of agreement.

8-43a Note. — The FAA has no jurisdictional authority over the use of prohibited or nonjoint use restricted/warning airspace; therefore, clearance cannot be issued for flight therein.

b. For MOA's and ATCAA's—

(1) Clear nonparticipating aircraft in/through a MOA/ATCAA provided prior coordination has been accomplished as covered in a letter of agreement between the controlling and using (scheduling) agencies and approved separation will be applied between MOA/ATCAA operations and nonparticipating aircraft.

8-43b(1) Reference. — Order 7610.4, Part 5.

(2) If unable to clear nonparticipating aircraft in/through a MOA/ATCAA in accordance with 8-43b. (1) above, clear aircraft via routing which will provide approved separation from the MOA/ATCAA airspace.

8-44 thru 8-49 RESERVED

Section 5. FUEL DUMPING

8-50 INFORMATION REQUIREMENTS

When information is received that an aircraft plans to dump fuel, determine the route and altitude it will fly and the weather conditions in which the operation will be conducted.

8-51 ROUTING

Except when it is dumping fuel for emergency reasons, an aircraft in either VFR OR IFR conditions may be requested to fly a different route.

8-52 ALTITUDE ASSIGNMENT

If an aircraft is dumping fuel in IFR conditions assign an altitude at least 2,000 feet above the highest obstacle within 5 miles of the route or pattern being flown.

8-53 SEPARATION MINIMA

Separate known aircraft from the aircraft dumping fuel as follows:

a. IFR aircraft, by one of the following:

(1) *1,000 feet (2,000 feet* above FL 290) above it.

(2) *2,000 feet* below it.

(3) *5 miles* radar.

(4) *5 miles* laterally.

b. VFR radar-identified aircraft by *5 miles* and in accordance with 5-90c.

8-54 INFORMATION DISSEMINATION

a. If you are in contact with an aircraft when it starts dumping fuel, inform other controllers and facilities which might be concerned. Facilities concerned shall broadcast an advisory on appropriate radio frequencies at 3-minute intervals until the dumping stops.

Phraseology:

ADVISORY TO AIRCRAFT NOT ON A-T-C CLEARANCE. FUEL DUMPING IN PROGRESS. (Type aircraft), (position), (course), (altitude). AVOID FLIGHT WITHIN FIVE NAUTICAL MILES IF AT THIS ALTITUDE. IF WITHIN FIVE NAUTICAL MILES, REMAIN AT LEAST ONE THOUSAND FEET ABOVE OR TWO THOUSAND FEET BELOW THE AIRCRAFT.

b. Broadcast a terminating advisory when the fuel dumping operation is completed.

Phraseology:

ADVISORY TO ALL CONCERNED. (Type aircraft) FUEL DUMP TERMINATED.

8-55 thru 8-59 RESERVED

Section 6. JETTISONING OF EXTERNAL STORES

8-60 JETTISONING OF EXTERNAL STORES

At locations where a drop area has been established for radar assistance in jettisoning of external stores, provide vectoring service upon request to:

8-60 Note 1. — Where required, a mutually satisfactory drop area for the jettisoning of external stores will be determined by radar-equipped towers and centers in cooperation with the local USAF units, Air Division, or civil operators and civil aircraft companies concerned.

8-60 Note 2. — FAA and Headquarters, USAF, have agreed to allow FAA facilities to vector USAF, Air Force Reserve, and Air National Guard aircraft for jettisoning of all external stores, i.e., tip tanks, JATO racks, special weapons, etc. Any similar vectoring service given to civil operators and civil aircraft companies operating Air Force type aircraft requires written agreement between the FAA and the user to relieve the FAA of possible liability. The regional counsel's office acts for FAA in executing this agreement.

a. USAF, ANG, and Air Force Reserve aircraft at any time.

b. Civil operators and civil aircraft when a written agreement is in effect for your location.

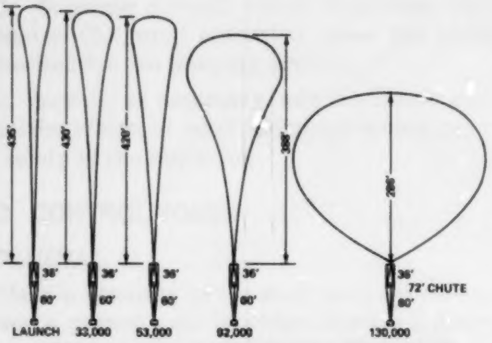
8-61 thru 8-69 RESERVED

Section 7. UNMANNED BALLOONS

8-70 APPLICATION

Apply the following procedures, as appropriate, when unmanned free balloons are within airspace for which you have control jurisdiction:

8-70 Note. — These procedures apply to unmanned free balloons that carry payloads as described in FAR 101.1(a)(4). Payloads may weigh several hundred pounds and the physical shape of the balloons change at various altitudes/flight levels. Balloon and payload ascend at an average rate of 400 feet a minute. Over the descent area, the payload is normally released from the balloon and descends by parachute at a minimum rate of 1,000 feet a minute. The balloon is normally deflated automatically when the payload is released. The operator is required to advise ATC one hour in advance of descent in accordance with FAR 101.39.



SHAPES OF 11 MILLION CUBIC FEET BALLOON AT VARIOUS ALTITUDES

8-70 Illustration

a. Post the balloon flight on flight progress strips along the planned trajectory and revise routing as tracking/position reports require.

8-70a Note. — The prelaunch notice information should be posted on flight progress strips for planning and operational purposes.

b. Radar flight follow balloons to the extent that equipment capabilities permit. If radar flight following is not possible, tracking should be attempted by communication with the "chase plane," telephone contact with the operator, pilot, or ground observation reports.

8-70b Note. Some operators have equipped their balloons with transponder beacons in addition to a radar reflection device or material required by FAR 101.35. But at cruise altitude, the balloon's communications equipment and transponder, if so equipped, are operated intermittently to conserve battery energy.

c. With pilot concurrence, provide separation between aircraft and balloons when you are satisfied that the balloon information is sufficiently reliable to provide the service. Do not attempt to separate aircraft from the balloon by using vertical separation unless you have accurate balloon altitude information.

d. Provide traffic advisories to all affected aircraft during initial contact specifying the balloon's known or estimated position, direction of movement, and altitude as "unknown" or "reported," as appropriate.

8-70d Note. — Unless ATC requires otherwise, operators of unmanned free balloons are required to monitor the course of the balloon and record its position at least every two hours. Except as required in FAR 101.39(h), balloon position reports are not forwarded by the operator unless requested by the ATC.

Phraseology:

UNMANNED FREE BALLOON OVER (name of location),

or

ESTIMATED OVER (name of location), MOVING (direction of movement).

LAST REPORTED ALTITUDE AT (altitude as reported by the operator or determined from pilot report),

or

ALTITUDE UNKNOWN.

e. Transfer flight following responsibility between facilities or between controllers by forwarding the following information when available:

8-70e Reference. — FAR 101.37, Notice Requirements. FAR 101.39, Balloon Position Report.

(1) Identification and type; e.g., Flight 804 Balloon.

(2) Last known position and altitude of balloon.

(3) General direction of movement and speed.

(4) ETA over facility boundary, sector boundary, or other point if believed to be reasonably accurate.

(5) Other pertinent information.

(6) If in radar contact, physically point out the target to the receiving controller.

(7) The name and address (if available) of the operator and the telephone number of the location where tracking is being accomplished.

8-71 DERELICT BALLOONS

Balloons become derelict when a moored balloon slips its mooring and becomes a hazard to air navigation or when an unmanned free balloon flight cannot be terminated as planned. When this occurs:

a. In the case of a moored balloon which has slipped its moorings, issue traffic advisories.

b. In the case of an unmanned free balloon, flight follow the balloon and, to the extent possible, provide aircraft under your control separation from the balloon.

c. Forward balloon position information received from pilot reports or derived from radar returns to your supervisor for further dissemination.

d. If radar contact of the balloon is lost, broadcast an advisory to all aircraft operating in the airspace affected by the derelict balloon at 10-minute intervals continuing until the derelict balloon is no longer a factor.

Phraseology:

ADVISORY TO ALL AIRCRAFT.

DERELICT BALLOON REPORTED IN THE VICINITY OF (location),

or

ESTIMATED IN VICINITY OF (location),

or

REPORTED OVER (location),

or

RADAR REPORTED OVER (location).

LAST REPORTED ALTITUDE AT (altitude as reported by operator or pilot report),

or

ALTITUDE UNKNOWN.

e. Transfer flight following responsibility as outlined in 8-70e.

8-71 Reference. — Order 7210.3-652, Derelict Balloons.

8-72 thru 8-79 RESERVED

Section 8. PARACHUTE JUMPING

8-80 COORDINATION

Coordinate any pertinent information prior to and at the end of each parachute jump or series of jumps which begins or ends in your area of jurisdiction with other affected ATC facilities/sectors.

8-80 Note. — FAR Part 105.25 prescribes the information required from each person requesting authorization or submitting notification for nonemergency parachute jumping activity.

8-80 Reference. — Order 7210.3-650, Nonemergency Parachute Jumping. FAR Part 105, Parachute Jumping.

8-81 POSITIVE CONTROL AREAS

EN ROUTE

a. Authorize parachute jumping only within airspace designated for the jumping activity.

b. Separate aircraft, other than those participating in the jump operation, from the airspace authorized for the jumping activity.

c. Impose, as necessary, any conditions and restrictions which in your judgment would promote the safety of the operation.

8-82 CONTROL ZONES

TERMINAL

Handle requests to conduct jump operations in or into a control zone in which there is a functioning control tower operated by the United States as follows:

a. Authorize parachute jumping with respect to known or observed traffic.

b. Issue advisory information to the jump aircraft and to nonparticipating aircraft as necessary for the safe conduct of the jump operation.

8-83 OTHER CONTROL AIRSPACE

Handle notifications to conduct jump operations in other controlled airspace as follows:

a. Issue a traffic advisory to the jump aircraft before the jump. Include aircraft type, altitude, and direction of flight of all known traffic which will transit the airspace within which the jump will be conducted.

8-83a Note. — FAR Part 105.14 prescribes that, except when otherwise authorized by ATC, parachute jumping is not allowed in or into controlled airspace unless radio communications have been established between the aircraft and the nearest FAA ATC facility or FSS at least 5 minutes before the jumping activity is to begin for the purpose of receiving information in the aircraft about known air traffic in the vicinity of the jump aircraft.

b. Issue advisories to all known aircraft which will transit the airspace within which the jump operations will be conducted. Advisories shall consist of the location, time, duration, and altitude from which the jump will be made.

c. When time or numbers of aircraft make individual transmissions impractical, advisories to nonparticipating aircraft may be broadcast on appropriate control frequencies, or when available, the ATIS broadcast.

d. When requested by the pilot and to the extent possible, assist nonparticipating aircraft to avoid the airspace within which the jump will be conducted.

TABLE OF CONTENTS

Chapter 9. EMERGENCIES

Page

Section 1. GENERAL

9-1 Emergency Determinations 9-1
9-2 Obtaining Information 9-1
9-3 Providing Assistance 9-1
9-4 Responsibility 9-1
9-5 Coordination 9-2
9-6 Airport Ground Emergency 9-2
9-7—9-9 Reserved 9-2

Section 2. EMERGENCY ASSISTANCE

9-10 Information Requirements 9-3
9-11 Frequency Changes 9-3
9-12 Aircraft Orientation 9-3
9-13 Altitude Change for Improved Reception 9-3
9-14 Overdue Aircraft 9-3
9-15 Emergency Situations 9-3
9-16 Information to be Forwarded to ARTCC 9-4
9-17 Information to be Forwarded to RCC 9-4
9-18 ALNOT 9-4
9-19 Responsibility Transfer to RCC 9-4
9-20 Aircraft Position Plots 9-4
9-21 ALNOT Cancellation 9-4
9-22 Hijacked Aircraft 9-5
9-23 VFR Aircraft in Weather Difficulty 9-5
9-24 Radar Assistance to VFR Aircraft in Weather Difficulty 9-5
9-25 Radar Assistance Techniques 9-5
9-26 Emergency Locator Transmitter (ELT) Signals 9-6
9-27 Aircraft Bomb Threats 9-6
9-28 Explosive Detection K-9 Teams 9-7
9-29 Emergency Airport Recommendation 9-7
9-30 Guidance to Emergency Airport 9-8
9-31 Emergency Obstruction Video Map (EOVM) 9-8
9-32—9-39 Reserved 9-8

Section 3. CONTROL ACTIONS

9-40 Traffic Restrictions 9-9
9-41 Lighting Requirements 9-9
9-42 Traffic Resumption 9-9
9-43 Communications Failure 9-9
9-44—9-49 Reserved 9-9

Section 4. DIRECTION FINDER SERVICE

9-50 Actions Required 9-10
9-51 DF Fixing by Net 9-10
9-52 DF Fixing by One Facility 9-10
9-53 VFR DF Service 9-10
9-54 Emergency DF Approach Procedures 9-11
9-55 Action After Position Determination 9-12
9-56 Emergency DF Approach 9-12
9-57—9-59 Reserved 9-12

TABLE OF CONTENTS—Continued

Page

Section 5. MISCELLANEOUS OPERATIONS

9-60 Navy Fleet Support Missions 9-13
9-61 "Dutch" and "Aspen" Aircraft 9-13
9-62 Explosive Cargo 9-13
9-63—9-69 Reserved 9-13

Section 6. GROUND MISSILE EMERGENCIES

9-70 Information Relay 9-14
9-71 IFR and Special VFR Minima 9-14
9-72 VFR Minima 9-14
9-73 Smoke Column Avoidance 9-14
9-74 Extended Notification 9-14

Chapter 9. EMERGENCIES

Section 1. GENERAL

9-1 EMERGENCY DETERMINATIONS

a. An emergency can be either a *Distress* or *Urgency* condition, as defined in the "Pilot/Controller Glossary."

b. A pilot who encounters a *Distress* condition should declare emergency by beginning the initial communication with the word "Mayday," preferably repeated three times. For an *Urgency* condition, the word "Pan" should be used in the same manner.

c. If the words "Mayday" or "Pan" are not used and you are in doubt that a situation constitutes an emergency or potential emergency, handle it as though it were an emergency.

d. Because of the infinite variety of possible emergency situations, specific procedures cannot be prescribed. However, when you believe an emergency exists or is imminent, select and pursue a course of action which appears to be most appropriate under the circumstances and which most nearly conforms to the instructions in this manual.

9-2 OBTAINING INFORMATION

Obtain enough information to handle the emergency intelligently. Base your decision as to what type of assistance is needed on information and requests received from the pilot because he is authorized by FAR 91 to determine a course of action.

9-3 PROVIDING ASSISTANCE

Provide maximum assistance to aircraft in distress. Enlist the services of available radar facilities and DF facilities operated by the FAA, the military services, and the Federal Communications Commission, as well as their emergency services and facilities, when the pilot requests or when you deem necessary.

9-3 Note 1. — The National SAR Plan assigns search and rescue responsibilities as follows:

a. To the military agencies — Conducting physical search and rescue operations.

b. To the FAA —

(1) Providing emergency service to aircraft in distress.

(2) Assuring that SAR procedures will be initiated if an aircraft becomes overdue or unreported. This is accomplished through the ATC system for IFR aircraft and the flight plan system for VFR aircraft.

(3) Attempting to locate overdue or unreported aircraft by INREQ and ALNOT communications search.

(4) Making all possible facilities available for use by the searching agencies.

9-3 Note 2. — FSS's serve as the central points for collecting and disseminating information on an overdue or missing aircraft which is not on an IFR flight plan.

9-3 Note 3. — Centers serve as the central points for collecting information, for coordinating with SAR, and for conducting a communications search by distributing any necessary ALNOT's concerning:

a. Overdue or missing IFR aircraft.

b. IFR aircraft in an emergency situation occurring in their respective areas.

c. Aircraft on a combination VFR/IFR or an airfiled IFR flight plan and 30 minutes have passed since the pilot requested IFR clearance and neither communication nor radar contact can be established with it. For SAR purposes, these aircraft are treated the same as IFR aircraft.

d. Overdue or missing aircraft which have been authorized to operate in accordance with Special VFR clearance.

9-3 Note 4. — The ARTCC serves as the central point for collecting information and coordinating with the RCC on ELT signals.

9-4 RESPONSIBILITY

a. If you are in communication with an aircraft in distress, handle the emergency and coordinate and direct the activities of assisting facilities. Transfer this responsibility to another facility only when you feel better handling of the emergency will result.

b. When you receive information about an aircraft in distress, forward detailed data to the center in whose area the emergency exists.

9-4b Note. — Notifying the center about a VFR aircraft emergency allows provision of IFR separation if considered necessary.

c. If the aircraft involved is operated by a foreign air carrier, notify the center serving the departure or destination point, when either point is within the United States, for relay to the operator of the aircraft.

d. The ARTCC shall be responsible for receiving and relaying all pertinent ELT signal information to the appropriate authorities.

9-4d Reference. — Emergency Locator Transmitter Signals, 9-26.

9-5 COORDINATION

Coordinate efforts to the extent possible to assist any aircraft believed overdue, lost, or in emergency status.

9-6 AIRPORT GROUND EMERGENCY

TERMINAL

When an emergency occurs on the airport proper, control other air and ground traffic to avoid conflicts in the area where the emergency is being handled. This also applies when routes within the airport proper are required for movement of local emergency equipment going to or from an emergency which occurs outside the airport proper.

9-6 Note. — Aircraft operated in proximity to accident or other emergency or disaster locations may cause hindrances to airborne and surface rescue or relief operations. Congestion, distraction or other effects such as wake turbulence from nearby airplanes and helicopters could prevent or delay proper execution of these operations.

9-6 Reference. — Order 7210.3-640, Temporary Flight Restrictions (FAR 91.91). FAR 91.91, Temporary Flight Restrictions.

9-7 thru 9-9 RESERVED

Section 2. EMERGENCY ASSISTANCE

9-10 INFORMATION REQUIREMENTS

a. Start assistance as soon as enough information has been obtained upon which to act. Information requirements will vary, depending on the existing situation. Minimum required information for in-flight emergencies is:

9-10a Note. — In the event of an ELT signal see 9-26.

(1) Aircraft identification and type.

(2) Nature of the emergency.

(3) Pilot's desires.

b. After initiating action, obtain the following items or any other pertinent information from the pilot or aircraft operator, as necessary:

(1) Aircraft altitude.

(2) Fuel remaining in time.

(3) Pilot reported weather.

(4) Pilot capability for IFR flight.

(5) Time and place of last known position.

(6) Heading since last known position.

(7) Airspeed.

(8) Navigation equipment capability.

(9) NAVAID signals received.

(10) Visible landmarks.

(11) Aircraft color.

(12) Number of people on board.

(13) Point of departure and destination.

(14) Emergency equipment on board.

9-11 FREQUENCY CHANGES

Although 121.5 MHz and 243.0 MHz are emergency frequencies, it might be best to keep the aircraft on the initial contact frequency. Change frequencies only when there is a valid reason.

9-12 AIRCRAFT ORIENTATION

Orientate an aircraft by the means most appropriate to the circumstances. Recognized methods include:

a. Radar.

b. DF.

c. NAVAID's.

d. Pilotage.

e. Sighting by other aircraft.

9-13 ALTITUDE CHANGE FOR IMPROVED RECEPTION

When you consider it necessary and if weather and circumstances permit, recommend that the aircraft maintain or increase altitude to improve communications, radar, or DF reception.

9-14 OVERDUE AIRCRAFT

Consider an aircraft to be overdue when neither communications nor radar contact can be established with it and 30 minutes have passed since:

a. Its ETA over a specified or compulsory reporting point or at a clearance limit in your area.

9-14a Note. — The center in whose area the aircraft is first unreported or overdue make this determination and takes any subsequent action required.

b. Its clearance void time.

9-14b Reference. — Departure Restrictions and Clearance Void/Release Time, 4-23.

9-15 EMERGENCY SITUATIONS

Consider that an aircraft emergency exists and inform the RCC or ARTCC and alert the DF Net when:

9-15 Note 1. — USAF facilities are only required to notify the ARTCC.

9-15 Note 2. — Each ARTCC shall be the DF Net Control for its flight advisory area except Washington ARTCC. The Norfolk RCC is the DF Net Control for the Washington flight advisory area.

a. An emergency is declared by either:

(1) The pilot.

(2) Facility personnel.

9-15a(2) Note. — An example of an emergency which should be declared by facility personnel is simultaneous unexpected loss of radar contact and radio communications with an aircraft.

(3) Officials responsible for the operation of the aircraft.

b. Reports indicate it has made a forced landing, is about to do so, or its operating efficiency is so impaired that a forced landing will be necessary.

c. Reports indicate the crew has abandoned the aircraft or is about to do so.

d. An emergency radar beacon response is received.

9-15d Note. — *EN ROUTE:* During Stage A operation, code 7700 causes EMRG to blink in field E of the data block.

e. Intercept or escort aircraft services are required.

f. The need for ground rescue appears likely.

g. An Emergency Locator Transmitter (ELT) signal is heard or reported.

9-15g Reference. — Providing Assistance, 9-3; Emergency Locator Transmitter (ELT) Signals, 9-26.

9-16 INFORMATION TO BE FORWARDED TO ARTCC

TERMINAL

When an aircraft is considered to be overdue or in emergency status, alert the ARTCC and forward the following information, as available:

a. Flight plan, including color of aircraft, if known.

b. Time of last transmission received, by whom, and frequency used.

c. Last position report and how determined.

d. Action taken by reporting facility and proposed action.

e. Number of persons on board.

f. Fuel status.

g. Facility working aircraft and frequency.

h. Last known position, estimated present position, and maximum range of flight of the aircraft based on remaining fuel and airspeed.

i. Position of other aircraft near aircraft's route of flight, when requested.

j. Whether or not an ELT signal has been heard or reported in the vicinity of the last known position.

k. Other pertinent information.

9-17 INFORMATION TO BE FORWARDED TO RCC

EN ROUTE

When an aircraft is considered to be overdue or in emergency status, alert the RCC and forward the following information, as available:

a. Facility and person calling.

b. Flight plan, including color of aircraft, if known.

c. Time of last transmission received, by whom, and frequency used.

d. Last position report and how determined.

e. Action taken by reporting facility and proposed action.

f. Number of persons on board.

g. Fuel status.

h. Facility working aircraft and frequency.

i. Last known position, estimated present position, and maximum range of flight of the aircraft, based on remaining fuel and airspeed.

j. Position of other aircraft near aircraft's route of flight, when requested.

k. Whether or not an ELT signal has been heard or reported in the vicinity of the last known position.

l. Other pertinent information.

9-18 ALNOT

EN ROUTE

a. In addition to routing to your regional office communications control center, issue an ALNOT to all centers and Area B circuits, generally 50 miles on either side of the route of flight from the last reported position to destination. Include the original or amended flight plan, as appropriate, and the last known position of the aircraft. At the recommendation of the RCC or at your discretion, the ALNOT may be issued to cover the maximum range of the aircraft.

9-18a Note. — Flight plan information on military aircraft is available at the FSS serving as tie-in station for the departure or destination airport. FAA tie-in stations for airports in the Continental United States are listed in the Location Identifiers Handbook. In the Pacific Region tie-in stations are listed in regional publications entitled, "Flight Plan Routing and Airport Search Directory." For flights with over-seas departure points, the information is available through the destination FSS or the appropriate IFSS.

b. Upon receipt of an INREQ or ALNOT, check the position records to determine whether the aircraft has contacted your facility. Notify the originator of the results or status of this check within one hour of the time the alert was received. Retain the alert in an active status, and immediately notify the originator of subsequent contact, until cancellation is received.

9-19 RESPONSIBILITY TRANSFER TO RCC

EN ROUTE

Transfer responsibility for further search to the RCC when one of the following occurs:

a. Thirty minutes have elapsed after the estimated aircraft fuel exhaustion time.

b. The aircraft has not been located within one hour after ALNOT issuance.

c. The ALNOT search has been completed with negative results.

9-20 AIRCRAFT POSITION PLOTS

Plot the flight path of the aircraft on a chart, including position reports, predicted positions, possible range of flight, and any other pertinent information. Solicit the assistance of other aircraft known to be operating near the aircraft in distress. Forward this information to the RCC or ARTCC, as appropriate.

9-21 ALNOT CANCELLATION

EN ROUTE

Cancel the ALNOT when the aircraft is located or the search is abandoned.

9-22 HIJACKED AIRCRAFT

When you observe a Mode 3/A Code 7500, do the following:

9-22 Note 1. — Military facilities will notify the appropriate FAA ARTCC, or the host nation agency responsible for en route control, of any indication that an aircraft is being hijacked. They will also provide full cooperation with the civil agencies in the control of such aircraft.

9-22 Note 2. — *EN ROUTE:* During narrowband radar operations, code 7500 causes HIJK to blink in the data block.

9-22 Note 3. — Only nondiscrete code 7500 will be decoded as the hijack code.

a. Acknowledge and confirm receipt of Code 7500 by asking the pilot to verify it. If the aircraft is not being subjected to unlawful interference, the pilot should respond to the query by broadcasting in the clear that he is not being subjected to unlawful interference. If the reply is in the affirmative or if no reply is received, do not question the pilot further but be responsive to the aircraft requests.

Phraseology:

(Identification) (name of facility) VERIFY SQUAWKING 7500.

9-22a Note. — Code 7500 is only assigned upon notification from the pilot that his aircraft is being subjected to unlawful interference. Therefore, pilots have been requested to refuse the assignment of code 7500 in any other situation and to inform the controller accordingly.

b. Notify supervisory personnel of the situation.

9-22b Reference. — Order 7210.3-580, Forcible Seizure of Aircraft.

c. Flight follow aircraft and use normal handoff procedures without requiring transmissions or responses by aircraft unless communications have been established by the aircraft.

d. If aircraft are dispatched to escort the hijacked aircraft, provide all possible assistance to he escort aircraft to aid in placing them in a position behind the hijacked aircraft.

9-22d Reference. — Order 7610.4, Part 11, Chapter 30.

e. To the extent possible, afford the same control service to the aircraft operating VFR observed on the hijack code.

9-23 VFR AIRCRAFT IN WEATHER DIFFICULTY

If a VFR aircraft requests assistance when it encounters or is about to encounter IFR weather conditions, request the aircraft to contact the appropriate control facility. Inform that facility of the situation. If the aircraft is unable to communicate with the control facility, relay information and clearances.

9-24 RADAR ASSISTANCE TO VFR AIRCRAFT IN WEATHER DIFFICULTY

a. If a VFR aircraft requests radar assistance when it encounters or is about to encounter IFR weather conditions, ask the pilot if he is qualified for and capable of conducting IFR flight.

b. If the pilot states he is qualified for and capable of IFR flight, request him to file an IFR flight plan and then issue clearance to destination airport, as appropriate.

c. If the pilot states he is not qualified for or not capable of conducting IFR flight, or if he refuses to file an IFR flight plan, take whichever of the following actions is appropriate:

(1) Inform the pilot of airports where VFR conditions are reported, provide other available pertinent weather information, and ask if he will elect to conduct VFR flight to such an airport.

(2) If the action in (1) is not feasible or the pilot declines to conduct VFR flight to another airport, provide radar assistance if the pilot:

(a) Declares an emergency.

(b) Refuses to declare an emergency and you have determined the exact nature of the radar services the pilot desires.

(3) If the aircraft has already encountered IFR conditions, inform the pilot of the minimum safe altitude. If the aircraft is below the minimum safe altitude and sufficiently accurate position information has been received or radar identification is established, furnish a heading or radial on which to climb to reach the minimum safe altitude.

9-25 RADAR ASSISTANCE TECHNIQUES

Use the following techniques to the extent possible when you provide radar assistance to a pilot not qualified to operate in IFR conditions:

a. Avoid radio frequency changes except when necessary to provide a clear communications channel.

b. Make turns while the aircraft is in VFR conditions so it will be in a position to fly a straight course while in IFR conditions.

c. Have pilot lower gear and slow aircraft to approach speed while in VFR conditions.

d. Avoid requiring a climb or descent while in a turn if in IFR conditions.

e. Avoid abrupt maneuvers.

f. Vector aircraft to VFR conditions.

9-26 EMERGENCY LOCATOR TRANSMITTER (ELT) SIGNALS

When an ELT signal is heard or reported:

a. *EN ROUTE:* Notify the Rescue Coordination Center (RCC).

9-26a Note. — FAA Form 7210-8. ELT Incident, contains standardized format for coordination with the RCC.

9-26a Reference. — Order 7210.3-1140.

b. *TERMINAL:* Notify the ARTCC which will coordinate with the Rescue Coordination Center (RCC).

9-26a. and b Note 1. — Operational ground testing of Emergency Locator Transmitters (ELT's) has been authorized during the first 5 minutes of each hour. To avoid confusing the tests with an actual alarm, the testing is restricted to no more than three audio sweeps.

9-26a. and b Note 2. — Controllers can expect pilots to report aircraft position and time the signal was first heard, aircraft position and time the signal was last heard, aircraft position at maximum signal strength, flight altitude, and frequency of the emergency signal (121.5/243.0). (See Airman's Information Manual, paragraph 454.)

c. *EN ROUTE:* Request DF Net attempt to obtain fixes or bearings on signal. Forward bearings or fixes obtained plus any other pertinent information to the RCC.

d. *TERMINAL:* Attempt to obtain fixes or bearings on the signal.

e. Solicit the assistance of other aircraft known to be operating in the signal area.

f. *TERMINAL:* Forward fixes or bearings and any other pertinent information to the ARTCC.

9-26f Note. — Fix information in relation to a VOR or VORTAC (radial-distance) facilitates accurate ELT plotting by RCC and should be provided when possible.

g. *EN ROUTE:* When the ELT signal strength indicates the signal may be emanating from somewhere on an airport or vicinity thereof, notify the on-site Airway Facilities personnel and the Regional Communications Control Center (CCC) for their actions. This action is in addition to the above.

h. *TERMINAL:* When the ELT signal strength indicates the signal may be emanating from somewhere on the airport or vicinity therof, notify the on-site Airway Facilities personnel and the ARTCC for their action. This action is in addition to the above.

i. Air Traffic personnel shall not leave their required duty stations to locate an ELT signal source.

9-26h and i Note. — Portable handcarried receivers assigned to air traffic facilities (where no Airway Facilities personnel are available) may be loaned to responsible airport personnel or local authorities to assist in locating the ELT signal source.

j. *EN ROUTE:* Notify the RCC, the CCC, and deactivate the DF net if signal source is located/terminated.

k. *TERMINAL:* Notify the ARTCC if signal source is located/terminated.

9-27 AIRCRAFT BOMB THREATS

a. When information is received from any source that a bomb has been placed on, in, or near an aircraft for the purpose of damaging or destroying such aircraft, notify your supervisor or the facility air traffic manager. If the threat is general in nature, handle it as a "Suspicious Activity." When the threat is targeted against a specific aircraft and you are in contact with the suspect aircraft, take the following actions as appropriate:

9-27a Note 1. — Facility supervisors are expected to notify the appropriate offices, agencies, operators/air carriers according to applicable plans, directives, and 7210.3-206 or applicable military directives.

9-27a Note 2. — "Suspicious Activity" is covered in 7210.3-255. Military facilities would report a "general" threat through the chain of command or according to service directives.

9-27a Note 3. — A "specific" threat may be directed to an aircraft registry or tail number, the air carrier flight number, the name of an operator, crew member or passenger, the departure/arrival points or times, or combinations thereof.

(1) Advise the pilot of the threat.

(2) Inform the pilot that technical assistance can be obtained from an FAA Aviation Explosives Expert.

9-27a(2) Note. — An FAA Aviation Explosive Expert is on call at all times and may be contacted by calling the FAA Communications Control Center, Washington, D.C., Area Code 202-426-3333 or Autovon 851-1180. Technical advice can be relayed to assist civil or military air crews in their search for a bomb and in determining what precautionary action to take if one is found.

(3) Ask the pilot if he desires to climb or descend to an altitude that would equalize or reduce the outside air pressure/existing cabin air pressure differential. Issue or relay an appropriate clearance considering MEA, MOCA, MRA and weather.

9-27a(3) Note. — Equalizing existing cabin air pressure with outside air pressure is a key step which the pilot may wish to take to minimize the damage potential of a bomb.

(4) Handle the aircraft as an emergency and/or provide the most expeditious handling possible with respect to the safety of other aircraft, ground facilities, and personnel.

9-27a(4) Note. — Emergency handling is discretionary and should be based on the situation. With certain types of threats, plans may call for a low-key action or response.

(5) Issue or relay clearances to a new destination if requested.

(6) When a pilot requests technical assistance or if it is apparent that a pilot may need such assistance, do NOT suggest what actions the pilot should take concerning a bomb, but obtain the following information and notify your supervisor who will contact the FAA Aviation Explosives Expert:

9-27a(6) Note. — This information is needed by the FAA Aviation Explosives Expert so that he can assess the situation and make immediate recommendations to the pilot. The Aviation Explosives Expert may not be familiar with all military aircraft configurations but he can offer technical assistance which would be beneficial to the pilot.

(a) Type, series, and model of the aircraft.

(b) Precise location/description of the bomb device if known.

(c) Other details which may be pertinent.

9-27a(6)(c) Note. — The following details may be of significance if known, but it is not intended that the pilot should disturb a suspected bomb/bomb container to ascertain the information: the altitude or time set for the bomb to explode, type of detonating action (barometric, time, anti-handling, remote radio transmitter), power source (battery, electrical, mechanical), type of initiator (blasting cap, flash bulb, chemical), and the type of explosive/incendiary charge (dynamite, black powder, chemical).

b. When a bomb threat involves an aircraft on the ground and you are in contact with the suspect aircraft, take the following actions in addition to those discussed in the preceding paragraph which may be appropriate:

(1) If the aircraft is at an airport where tower control or FSS advisory service is not available, or if the pilot ignores the threat at any airport, recommend that takeoff be delayed until the pilot or aircraft operator establishes that a bomb is not aboard in accordance with FAR, Part 121. If the pilot insists on taking off and in your opinion the operation will not adversely affect other traffic, issue or relay an ATC clearance.

9-27b(1) Reference. — FAR 121.538, Aircraft Security.

(2) Advise the aircraft to remain as far away from other aircraft and facilities as possible, to clear the runway, if appropriate, and to taxi to an isolated or designated search area. When it is impractical or if the pilot takes an alternative action (e.g., parking and off-loading immediately), advise other aircraft to remain clear of the suspect aircraft by at least 100 yards, if able.

9-27b(2) Note. — Passenger deplaning may be of paramount importance and must be considered before the aircraft is parked or moved away from service areas. The decision to use ramp facilities rests with the pilot, aircraft operator/airport manager.

c. If you are unable to inform the suspect aircraft of a bomb threat or if you lose contact with the aircraft, advise your supervisor and relay pertinent details to other sectors or facilities as deemed necessary.

d. When a pilot reports the discovery of a bomb or suspected bomb on an aircraft which is airborne or on the ground, determine the pilot's intentions and comply with his requests in so far as possible. Take all of the actions discussed in the preceding paragraphs which may be appropriate under the existing circumstances.

e. The handling of aircraft when a hijacker has or is suspected of having a bomb requires special considerations. Be responsive to the pilot's requests and notify supervisory personnel. Apply hijacking procedures and offer assistance to the pilot according to the preceding paragraphs, if needed.

9-28 EXPLOSIVE DETECTION K-9 TEAMS

Take the following actions should you receive an aircraft request for the location of the nearest explosive detection K-9 team.

9-28 Reference. — Order 7210.3-208, Explosives Detection K-9 Teams.

a. Obtain the aircraft identification and position and advise your supervisor of the pilot request.

b. When you receive the nearest location of the explosive detection K-9 team, relay the information to the pilot.

c. If the aircraft wishes to divert to the airport location provided, obtain an estimated arrival time from the pilot and advise your supervisor.

9-29 EMERGENCY AIRPORT RECOMMENDATION

Consider the following factors when recommending an emergency airport:

a. Remaining fuel in relation to airport distances.

b. Weather conditions.

c. Airport conditions.

d. NAVAID status.

e. Aircraft type.

f. Pilot's qualifications.

g. Vectoring or homing capability to the emergency airport.

9-30 GUIDANCE TO EMERGENCY AIRPORT

When necessary, use any of the following for guidance to the airport:

a. Radar.

b. DF.

c. Following another aircraft.

d. NAVAID's.

e. Pilotage by landmarks.

f. Compass headings.

9-31 EMERGENCY OBSTRUCTION VIDEO MAP (EOVM)

a. The EOVM is intended to facilitate advisory service to an aircraft in an emergency situation wherein an appropriate terrain/obstacle clearance minimum altitude cannot be maintained. It shall only be used and the service provided under the following conditions:

(1) The pilot has declared an emergency, or

(2) The controller has determined that an emergency condition exists or is imminent because of the pilot's inability to maintain an appropriate terrain/obstacle clearance minimum altitude.

9-31a(2) Note. — Appropriate terrain/obstacle clearance minimum altitudes may be defined as Minimum IFR Altitude (MIA), Minimum En Route Altitude (MEA), Minimum Obstruction Clearance Altitude (MOCA), or Minimum Vectoring Altitude (MVA).

b. When providing emergency vectoring service, the controller shall advise the pilot that any headings issued are emergency advisories intended only to direct the aircraft toward and over an area of lower terrain/obstacle elevation.

9-31 Reference. — Order 7210.3-393, Emergency Obstruction Video Map.

9-32 thru 9-39 RESERVED

Section 3. CONTROL ACTIONS

9-40 TRAFFIC RESTRICTIONS

Unless radar separation is used, when an aircraft is unreported, the facility responsible shall restrict or suspend other IFR traffic for 30 minutes after whichever of the following times is applicable:

a. The time at which approach clearance was delivered to the pilot.

b. The EFC time delivered to the pilot.

c. The arrival time over the NAVAID serving the destination airport.

d. The current estimate, either the control facility's or the pilot's, whichever is later, at:

(1) The appropriate en route NAVAID or fix, and

(2) The NAVAID serving the destination airport.

9-41 LIGHTING REQUIREMENTS

a. *EN ROUTE:* At non-tower or non-FSS locations, request the airport management to light all runway lights, approach lights, and all other required airport lighting systems, for at least 30 minutes before the ETA of the unreported aircraft until the aircraft has been located or for 30 minutes after its fuel supply is estimated to be exhausted.

b. *TERMINAL:* Operate runway lights, approach lights and all other required airport lighting systems for at least 30 minutes before the ETA of the unreported aircraft until the aircraft has been located or for 30 minutes after is fuel supply is estimated to be exhausted.

9-42 TRAFFIC RESUMPTION

After the 30-minute traffic suspension period has expired, resume normal air traffic control if the operators or pilots of other aircraft concur. This concurrence must be maintained for a period of 30 minutes after the suspension period has expired.

9-43 COMMUNICATIONS FAILURE

Take the following actions, as appropriate, if two-way radio communications is lost with an aircraft:

9-43 Note 1. — When an IFR aircraft experiences two-way radio communications failure, air traffic control is based on anticipated pilot actions. Pilot procedures and recommended practices are set forth in the AIM, FAR's, and pertinent military regulations.

9-43 Note 2. — Should the pilot of an aircraft equipped with a coded radar beacon transponder experience a loss of two-way radio capability, he can be expected to:

a. Adjust his transponder to reply on Mode 3/A Code 7700 for a period of 1 minute.

b. Then change to Code 7600 and remain on 7600 for a period of 15 minutes or the remainder of the flight, whichever occurs first,

c. Repeat steps 1 and 2, as practicable.

a. Broadcast clearances through any available means of communications including the voice feature of NAVAID's.

9-43a Note 1. — Some UHF equipped aircraft have VHF navigation equipment and can receive 121.5 MHz.

9-43a Note 2. — 'Any available means' includes the use of FSS and ARINC.

9-43a Reference. — Clearance Prefix, 4-13.

b. Attempt to re-establish communication by having the aircraft use its transponder or make turns to acknowledge clearances and answer questions. Request any of the following in using the transponder:

(1) Request the aircraft to reply Mode 3/A "IDENT."

(2) Request the aircraft to reply on Code 7600 of, if already on Code 7600, the appropriate stratum code.

(3) Request the aircraft to change to "standby" for sufficient time for you to be sure that the lack of a target is the result of the requested action.

Phraseology:

REPLY NOT RECEIVED, IF YOU HEAR ME, (appropriate instructions).

(Action) OBSERVED, WILL CONTINUE RADAR CONTROL.

c. Broadcast a clearance for the aircraft to proceed to its filed alternate airport at the MEA if the aircraft operator concurs.

9-44 thru 9-49 RESERVED

Section 4. DIRECTION FINDER SERVICE

9-50 ACTIONS REQUIRED

When providing DF services to an aircraft in emergency status:

a. Determine if aircraft is in VFR or IFR weather conditions, fuel remaining, altitude, and heading.

b. If the aircraft is operating in IFR weather conditions, inform the pilot of the minimum safe altitude.

c. Determine if aircraft is on a flight plan. If the aircraft is not on an IFR flight plan and is in VFR weather conditions, advise the pilot to remain VFR.

d. Alert the DF Net whenever one of the following conditions exists:

(1) The pilot is lost.

(2) An emergency is declared.

9-50d(2) Note. — Alert the Net even if the aircraft is radar identified. It need not be alerted if a terminal controller has the aircraft in sight.

(3) An ELT is heard or reported.

9-51 DF FIXING BY NET

When a DF Net is in operation, determine aircraft position as follows:

a. *TERMINAL:* Tell the aircraft to transmit for 10 seconds.

b. *TERMINAL:* Plot the bearings obtained from two or more stations. Inform the aircraft of its position.

9-51b Note. — The center, or the DF station designated as Net Control, is responsible for evaluating and plotting bearings received from individual stations.

9-51b Reference. — Order 7210.3-823, DF Net Control Position Operation.

c. *EN ROUTE:* Plot cross bearing or other position data obtained from DF stations.

9-52 DF FIXING BY ONE FACILITY

TERMINAL

One DF facility can determine an aircraft's position by:

9-52 Note. — One station DF fixing is based on zero winds.

a. Plotting bearings from a reported VOR radial and an observed DF bearing.

b. Time method:

(1) Determine the aircraft's heading and DF bearing.

(2) Tell the aircraft to turn left or right, whichever requires the lesser amount of turn, to a heading perpendicular to the DF bearing.

(3) After turn is completed, tell the aircraft to transmit (normally 10 seconds). Observe DF bearing.

(4) One minute later, request another transmission. Determine bearing and turn aircraft toward DF site.

(5) Divide the difference in bearings (steps 3 and 4) into 60. The result is the number of minutes the aircraft is from the DF site.

9-52b Example. —

Original bearing of 360 and aircraft heading of 200, the aircraft should be advised to turn right to a heading of 270. Observe bearing, wait 1 minute, and observe bearing. If the bearing (after completion of turn) was 337 and the second bearing was 325, a difference of 12, the aircraft is 5 minutes from the DF site.

c. Distance method:

(1) Use the procedures specified in steps (1) through (4) in **b** above. Request aircraft's true airspeed.

(2) Compute the distance by dividing the bearing change (for 1 minute) into the TAS figure.

9-52c Example —

140 (TAS) ÷ (bearing change for 1 minute) = 14 miles from DF site.

9-53 VFR DF SERVICE

TERMINAL

a. Provide DF service to VFR aircraft when either of the following conditions exist:

(1) The pilot requests the service.

(2) You suggest the service and the pilot concurs.

b. After determining an aircraft's bearing, provide DF service by specifying direction of turn and magnetic heading to be flown after completion of turn.

c. Issue the following information to the aircraft:

(1) Altimeter setting.

(2) Pertinent information on known field conditions and the latest weather information at the destination airport.

d. Request the aircraft's heading and altitude.

Phraseology:

WHAT IS YOUR HEADING AND ALTITUDE?

e. While receiving the reply, determine the bearing; then, inform the aircraft of the following:

(1) Direction of turn.

(2) Heading, spoken in three digits. (Do not state the word "degrees").

(3) Nature of service.

(5) Microphone technique.

(6) Request for report when airport is in sight.

Phraseology:

TURN LEFT/RIGHT HEADING (degrees) FOR DF GUIDANCE TO (name of airport, fix, or location). MAINTAIN VFR AT ALL TIMES. WHEN A REQUEST FOR TRANSMISSION IS RECEIVED, PRESS YOUR MICROPHONE BUTTON FOR THE SPECIFIED NUMBER OF SECONDS, *and if appropriate,* REPORT (name) AIRPORT IN SIGHT.

f. Request the aircraft to transmit for specified periods, as required. The frequency of these requests will vary depending on such factors as wind, frequency congestion, and distance, but should be made at least once each minute until aircraft reports airport in sight or service is terminated.

Phraseology:

TRANSMIT (number — normally 10) SECONDS. TURN LEFT/RIGHT, HEADING (degrees) *or* CONTINUE HEADING (degrees).

g. Inform aircraft when DF service is terminated.

Phraseology:

DF SERVICE TERMINATED.

9-53g Note. — Service may be terminated when airport is in sight, the desired fix or location reached, practice steers or approaches are discontinued, etc.

9-54 EMERGENCY DF APPROACH PROCEDURES

TERMINAL

a. Under emergency conditions where a standard instrument approach cannot be executed, provide DF guidance and instrument approach service as follows:

(1) Obtain and relay ATC clearance including radio failure procedures.

(2) Issue destination airport weather.

(3) Provide guidance as specified in 9-53e., except delete the VFR requirement. To avoid large turns over the DF site, aircraft should be guided to pass over the DF site established on the course that it will maintain on the outbound leg of the approach.

Phraseology:

TURN LEFT/RIGHT HEADING (degrees) FOR DF GUIDANCE AND APPROACH TO THE (name) AIRPORT. MAINTAIN (altitude specified by ATC). WHEN A REQUEST FOR TRANSMISSION IS RECEIVED, PRESS YOUR MICROPHONE BUTTON FOR THE SPECIFIED NUMBER OF SECONDS. REPORT AIRPORT IN SIGHT. IF NO TRANSMISSIONS ARE RECEIVED FOR (time interval) PROCEED VFR. IF UNABLE, PROCEED (routing, fix and altitude as specified by ATC). CONTACT (facility) ON (frequency).

b. Inform the pilot when he is over the DF site, advise him to perform landing check, and provide guidance for outbound track.

Phraseology:

OVER DF SITE, PERFORM LANDING CHECK, CONTINUE HEADING (degrees) *or* TURN LEFT/RIGHT, HEADING (degrees).

c. Provide DF approach guidance in accordance with approved procedures.

9-54c Note 1. — Depending on the terrain factor, it may be necessary to include climb instructions in radio failure procedures.

9-54c Note 2. — Approved procedures are specified on Form 8260 or in specified military documents.

(1) Triangle Approach Pattern.

(a) Time the outbound leg and issue descent information. Normally, the outbound track should be maintained for 3 minutes but this may be adjusted, depending on airspeed and nature of the emergency. Time intervals between bearing observations should not exceed 15 seconds.

Phraseology:

ON OUTBOUND LEG. DESCEND AND MAINTAIN (altitude specified).

(b) When outbound leg is completed, issue turn instructions so that the aircraft's course is perpendicular to the final approach course. Issue further descent information, if so specified. Issue missed approach procedures as specified on FAA Form 8260-6.

Phraseology:

ON BASE LEG. IN CASE OF MISSED APPROACH, CLIMB TO (altitude) ON COURSE (degrees) WITHIN (number) MILES.

(c) At least two turns should be made onto final approach.

(d) When aircraft is on final approach, advise it to start descent and provide minimum descent altitude and field elevation information. Take bearings more frequently. Time intervals between bearing observations should not exceed 5 seconds during the estimated last 30 seconds of the approach.

Phraseology:

ON FINAL APPROACH, BEGIN DESCENT. MINIMUM DESCENT ALTITUDE (number of feet). FIELD ELEVATION (number of feet).

(e) If the aircraft misses approach, inform the appropriate control facility.

(2) Teardrop Approach Pattern.

(a) Provide guidance to establish the aircraft on the outbound course. Issue descent information, if appropriate. Time intervals between bearing observations should not exceed 15 seconds.

(b) Issue direction of turn and inbound heading information. Issue missed approach procedures as specified.

(c) When procedure turn is complete, provide directional guidance and issue descent information. Time intervals between bearing observations should not exceed 5 seconds during the estimated last 30 seconds of the approach.

(d) If aircraft misses approach, inform the appropriate control facility.

9-55 ACTION AFTER POSITION DETERMINATION

EN ROUTE

When the position of the aircraft has been determined, inform the pilot and provide any requested information, such as direction and distance to the nearest airport. If aircraft is operating in IFR weather conditions, clear the aircraft (if appropriate, authorize a DF facility to provide guidance) to an area where one of the following conditions exist:

a. VFR weather conditions are reported.

b. The aircraft can continue flight using NAVAID's or radar guidance.

c. Transition to an approach aid can be made and an instrument approach executed.

9-56 EMERGENCY DF APPROACH

EN ROUTE

Under emergency conditions where a standard instrument approach cannot be executed, clear an aircraft for DF guidance and instrument approach.

9-57 thru 9-59 RESERVED

Section 5. MISCELLANEOUS OPERATIONS

9-60 NAVY FLEET SUPPORT MISSIONS

When you receive information concerning an emergency to a U.S. Navy "Special Flight Number" aircraft, do the following:

a. Handle Navy Fleet Support Mission aircraft as follows:

(1) *EN ROUTE:* Relay immediately, via collect telephone call, all pertinent information to Fleet Operations Control at Norfolk, Virginia, telephone 804-444-6602.

(2) *TERMINAL:* Inform the nearest center of all the pertinent information.

b. Relay the words "Special Flight Number" followed by the number given as part of the routine IFR flight information.

c. Honor pilot requests for changes to route, altitude, and destination whenever possible.

9-61 DUTCH AND ASPEN AIRCRAFT

If an aircraft (USAF YF-12A or SR-71) using the call sign "Dutch" or "Aspen" reports inflight difficulty or declares an emergency (by direct communications or relay from another facility), in addition to normal emergency handling of the aircraft, take the following action:

a. *EN ROUTE:* Forward the report as follows:

(1) For "Dutch" aircraft — Call Los Angeles Center on FTS telephone 799-1101 or 947-4101 or use AUTOVON.

(2) For "Aspen" aircraft — Call Oakland Center on FTS telephone 449-6331 or 797-3200 or use AUTOVON.

(3) For either "Dutch" or "Aspen" aircraft — Call the Aerospace Defense Command Facility and coordinate any further actions with them.

b. *EN ROUTE:* Comply with all requests from these pilots, the Aerospace Defense Command Facility, or the area manager of the Los Angeles or Oakland Centers.

c. *EN ROUTE:* Contact the area manager of the Los Angeles or Oakland Center, as appropriate, if there is any question regarding action to be taken.

d. *TERMINAL:* Forward the report verbatim to the associated center.

e. *TERMINAL:* Comply with all requests from the pilot or the center.

f. *TERMINAL:* Contact the center area manager if there is any question regarding action to be taken.

g. Do not discuss actions taken in regard to these aircraft with other than authorized personnel.

9-62 EXPLOSIVE CARGO

TERMINAL

When you receive information that an emergency landing will be made with explosive cargo aboard, inform the pilot of the safest or least congested airport areas. Relay the explosive cargo information to:

a. The emergency equipment crew.

b. The airport management.

c. The appropriate military agencies when requested by the pilot.

9-63 thru 9-69 RESERVED

Section 6. GROUND MISSILE EMERGENCIES

9-70 INFORMATION RELAY

When you receive information concerning a ground missile emergency, notify other concerned facilities and take action to have alerting advisories issued by:

a. *EN ROUTE:* Air carrier company radio stations for each VFR company aircraft which is or will be operating in the vicinity of the emergency.

b. *EN ROUTE:* FSS's adjacent to the emergency location.

c. *TERMINAL:* Relay all information concerning a ground missile emergency to the center within whose area the emergency exists and disseminate as an NOTAM.

9-70c Reference. — Glossary (Notice to Airmen).

9-71 IFR AND SPECIAL VFR MINIMA

Reroute IFR and Special VFR aircraft as necessary to avoid the emergency location by one of the following minima or by greater minima when suggested by the notifying official:

a. Lateral separation — *1 mile* between the emergency location and either of the following:

(1) An aircraft under radar control and the emergency location which can be accurately determined by reference to the radar scope.

(2) The airspace to be protected for the route being flown.

b. Vertical separation — *6,000 feet* above the surface over the emergency location.

9-72 VFR MINIMA

Advise all known VFR aircraft which are, or will be, operating in the vicinity of a ground missile emergency to avoid the emergency location by 1 mile laterally or 6,000 feet vertically, or by a greater distance or altitude when suggested by the notifying official.

9-73 SMOKE COLUMN AVOIDANCE

Advise all aircraft to avoid any observed smoke columns in the vicinity of a ground missile emergency.

9-74 EXTENDED NOTIFICATION

EN ROUTE

When reports indicate that an emergency will exist for an extended period of time, a Notice to Airmen may be issued.

TABLE OF CONTENTS

Chapter 10. CANADIAN AIRSPACE PROCEDURES

Page

Section 1. GENERAL CONTROL

10-1 Application 10-1
10-2 Definitions 10-1
10-3 Class B Airspace 10-1
10-4 Altimeter Setting 10-1
10-5 Altitude Assignment 10-2
10-6 Departure Clearance/Communication Failure 10-2
10-7 Parachute Jumping 10-2
10-8 Transponder/Mode C Deviations (IFR) Flight 10-2
10-9 Reserved 10-2

Section 2. IFR OPERATIONS

10-10 Longitudinal Separation 10-3
10-11 Vertical Separation 10-3
10-12 Lateral Separation 10-3
10-13 Initial Separation of Departures and Arrivals 10-4
10-14 Visual Separation and VFR 10-4
10-15 Special VFR 10-4
10-16 Approaches 10-4
10-17 Lengthy Delay 10-5
10-18 Altitude for Direction of Flight 10-5
10-19—10-29 Reserved 10-5

Section 3. RADAR OPERATION

10-30 Radar Separation 10-6
10-31 Radar Separation Minima 10-6
10-32 Passing—Opposite Courses 10-6
10-33 Class F (Special Use) Airspace 10-6
10-34 Wake Turbulence Separation Minima 10-6
10-35 Radar Arrivals 10-7
10-36 Emergency 10-7
10-37—10-49 Reserved 10-7

Section 4. FUEL DUMPING

10-50 Separation 10-8
10-51 Advisories 10-8

Chapter 10. CANADIAN AIRSPACE PROCEDURES

Section 1. GENERAL CONTROL

10-1 APPLICATION

a. Where control responsibility within Canadian airspace has been formally delegated to the FAA by the Canadian Ministry of Transport, apply basic FAA procedures except for the Canadian procedures (exceptions, additions, and modifications) contained in this chapter.

b. Do not use the FAA procedures contained in the following paragraphs in Canadian airspace:

(1) Above FL 230 — 6-31a.

10-1b(1) Reference. — Minima on Same, Converging or Crossing Courses, 6-31.

(2) At any time:

(a) 6-31e.

(b) Section 7 of Chapter 6.

(c) 7-10.

(d) 5-73.

(e) 5-112.

(f) 5-124.

10-1b(2) References. — Passing or Diverging, 5-73; Vectors Below Minimum Altitude, 5-112; Approach Separation Responsibility, 5-124; Minima on Same, Converging, or Crossing Courses, 6-31; Timed Approaches, Chapter 6, Section 7; Visual Separation, 7-10.

(3) *TERMINAL:* The cleared for the option procedures.

10-1b(3) Reference. — Sequence/Spacing Application, 3-90.

10-2 DEFINITIONS

Class A Airspace — Controlled airspace within which only IFR flights are permitted.

Class B Airspace — Controlled airspace within which only IFR and Controlled VFR flights are permitted.

Class C Airspace — Controlled airspace within which both IFR and VFR flights are permitted but VFR flights require a clearance from ATC to enter.

Class D Airspace — Controlled airspace within which both IFR and VFR flights are permitted but VFR flights do not require a clearance from ATC to enter.

Class E Airspace — Airspace within which IFR and VFR flights are not subject to control.

Class F Airspace — Airspace of defined dimensions within which activities must be confined because of their nature, or within which limitations are imposed upon aircraft operations that are not a part of those activities, or both.

High Level Airspace — All airspace within the Canadian Domestic Airspace 18,000 feet MSL and above.

Low Level Airspace — All airspace within the Canadian Domestic Airspace below 18,000 feet MSL.

Alert Area — An airspace of defined dimensions within which a high volume of pilot training or an unusual type of aerial activity may be carried out. (Publication designation — CYA).

Danger Area — An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times. (Publication designation — CYO.)

Military Flying Area — An airspace of defined dimensions within High Level Airspace designated for the use of Military Training and Testing.

Controlled VFR Flight — A flight conducted under the visual flight rules within Class B Airspace and in accordance with an air traffic control clearance.

10-3 CLASS B AIRSPACE

The ATC procedures pertinent to IFR flight shall be applied to controlled visual flight rules (CVFR) aircraft. Do not apply visual separation or VFR-on-top clearance or 1000-on-top clearance.

10-3 Note 1. — The CVFR pilot is responsible to maintain VFR flight and visual reference to the ground at all times.

10-3 Note 2. — ATC clearance for CVFR flight will not normally be issued prior to takeoff, but rather upon receipt of a position report and a request for clearance by a pilot upon reaching the last 1,000 foot attitude below the base of Class B Airspace (11,500 MSL).

10-4 ALTIMETER SETTING

a. For departing aircraft:

Issue altimeter setting even though the aircraft states that it has the current ATIS information. You may omit time and altimeter in a taxi clearance if the information was issued in a preflight radio check.

b. For arriving aircraft:

Except for the altimeter setting, you need not issue information included in the current ATIS broadcast provided the aircraft acknowledges receipt of the broadcast.

c. For en route aircraft:

Issue the altimeter setting associated with a reporting point when an en route aircraft operating below FL 180 reports passing it. In addition, issue the setting for the next reporting point along the aircraft's route.

10-4c Reference. — Altimeter Setting Issuance Below Lowest Usable FL, 2-111.

10-5 ALTITUDE ASSIGNMENT

a. When issuing altitude information, do not use the term "cruise."

10-5a Reference. — Altitude Information, 4-45.

b. When a higher altitude is required because of an MEA, clear the aircraft so it will be at or above the new MEA before arriving at the fix beyond which it applies.

10-5b Reference. — Minimum Enroute Altitudes, 4-44.

10-6 DEPARTURE CLEARANCE/COMMUNICATION FAILURE

a. Base control action regarding radio failures in Canadian Airspace on the fact that pilots are required to comply with Canadian Airspace Regulations.

b. Canadian communication failure regulations are similar to FAR 91.127; however, the following major difference shall be considered when planning control actions:

Except when issued alternate radio failure instructions by an ATC Unit, pilots flying a turbine-powered (turboprop or turbojet) aircraft and cleared on departure to a point other than the destination will proceed to the destination airport in accordance with the flight plan, maintaining the last assigned altitude or flight level or the minimum enroute IFR altitude, whichever is higher, until 10 minutes beyond the point specified in the clearance (clearance limit), and then proceed at altitude(s) or flight level(s) filed in the flight plan. When the aircraft will enter United States' airspace within 10 minutes after passing the clearance limit, the climb to the flight planned border crossing altitude is to be commenced at the estimated time of crossing the Canadian/United States boundary.

c. When issuing clearances to departures from Canadian airports and paragraph 4-21h(3) applies, specify the radio failure altitude in lieu of issuing the "Expect (altitude)."

Phraseology:

IN THE EVENT OF RADIO FAILURE, MAINTAIN (the filed altitude or an altitude within the filed stratum as near as possible to the filed altitude).

10-7 PARACHUTE JUMPING

Do not authorize parachute jumping without prior permission from the appropriate Canadian authority.

10-7 Note. — Canadian regulations require written authority from the Ministry of Transport.

10-8 TRANSPONDER/MODE C DEVIATIONS (IFR FLIGHT)

Preflight transponder/Mode C deviations can be approved in Canadian airspace only upon receipt of written notification.

10-8 Note. — Remarks in flight plan may serve as written notification.

10-9. RESERVED

Section 2. IFR OPERATIONS

10-10 LONGITUDINAL SEPARATION

a. Separate aircraft at any altitude using DME by a minimum of *20 miles* except that *10 miles* may be used when the leading aircraft maintains a speed at least 40 knots faster than the succeeding aircraft.

10-10a Reference. — Minima on Same, Converging, or Crossing Courses, 6-31.

b. Separate aircraft above FL 230 by 5 minutes when the leading aircraft maintains a speed at least 40 knots faster than the following aircraft and one of the conditions listed in 6-31b.(1), (2), or (3) exists.

10-10b Reference. — Minima on Same, Converging or Crossing Courses, 6-31.

10-11 VERTICAL SEPARATION

a. Provide vertical separation to opposite direction aircraft at FL 230 and below until both aircraft have reported passing the same NAVAID or visual fix; or both aircraft have reported passing the same omni radial at an angle of at least 45 degrees or more and are:

(1) At least *2 minutes* apart when within 25 miles of the NAVAID producing the radial.

(2) At least *4 minutes* apart when beyond 25 miles of the NAVAID producing the radial.

10-11a(2) Reference. — Minima on Opposite Courses, 6-32.

b. Provide vertical separation to opposite direction aircraft above FL 230 until both aircraft have reported the same NAVAID or radial provided the radial or course is crossed at an angle of at least 45 degrees and the aircraft are at least *2 minutes* apart.

10-11b Reference. — Minima on Opposite Courses, 6-32.

c. When reports indicate that opposite direction aircraft using DME have passed, you may clear an aircraft to climb or descend when position reports indicate *5-mile* separation exists provided the outbound aircraft is 15 miles or more from the DME NAVAID.

10-11c Reference. — Minima on Opposite Courses, 6-32.

d. Unless lateral separation exists, apply vertical separation between an en route aircraft and a holding aircraft or an aircraft on an instrument approach procedure before and after the outer-edge of the appropriate protected airspace for the following time period:

(1) FL 230 and below:

(a) *15 minutes.*

(b) *10 minutes* if NAVAID's permit frequent determination of position and speed.

(2) Above FL 230:

(a) *20 minutes.*

(b) *15 minutes* if NAVAID's are 60 minutes or less flying time apart.

(c) *10 minutes* if NAVAID's are 40 minutes or less flying time apart.

e. You may discontinue vertical separation between an en route aircraft and a holding aircraft or an aircraft on an instrument approach procedure provided the en route aircraft:

(1) Has reported over a fix within the appropriate protected airspace; and

(2) Is *5 minutes* from the outer-edge of the holding or approach area.

10-12 LATERAL SEPARATION

Protect airspace along airways, routes, direct courses, and course changes 15 degrees or less as follows:

10-12 Reference. — Separation Methods, 6-40; Minima Along Other Than Established Airways or Routes, 6-43.

a. In Low Level Controlled Airspace below 18,000 MSL, protect:

(1) For tracks along:

(a) Low level airways; and

(b) Off-Airway tracks within signal coverage of ground-based navigation aids, a width of *4.5 miles* each side of track outward from the NAVAID to a distance of 39.5 miles; beyond this distance, protect within lines extending from the NAVAID and diverging at 6.5 degrees each side of track until interception of similar lines from an adjacent NAVAID.

(2) For Off-Airway tracks beyond signal coverage range of ground-based navigational aids, a width of *45 miles* each side of track. This separation applies to random RNAV routes for areas outside of radar coverage.

b. In High Level Controlled Airspace above 18,000 MSL, protect:

(1) For tracks along airways formed by VOR radials, a width of *4.5 miles* each side track outward from the NAVAID to a distance of 39.5 miles; beyond this distance, protect within lines extending from the NAVAID and diverging 8.5 degrees each side of track until interception of similar lines from the adjacent ontrack NAVAID;

(2) For tracks along airways formed by:

(a) ADF Bearings; and

(b) A combination of VOR radials and ADF, as in (1) except to a distance of 30.2 miles, then diverging at 8.5 degrees.

(3) For Off-Airway tracks within signal coverage of ground-based NAVAID's, as required by (1) or (2) as appropriate;

(4) For Off-Airway tracks beyond signal coverage of ground based NAVAID's, a width of *45 miles* each side of track. This separation applies to random RNAV routes.

c. Where a course change at FL 180 and above is 16 degrees through 90 degrees, protect additional airspace on the overflown side beginning at the point where the course changes until the aircraft is reestablished on course, as follows:

(1) An amount determined by use of the appropriate Canadian turning template and covered in a letter of agreement with the appropriate Canadian air traffic control unit, or

10-12c(1) Note. — Templates have been supplied to Canadian ATC units for use in determining airspace to be protected for aircraft turning. Where possible, advance coordination should be accomplished with the appropriate Canadian unit to obtain a determination by template as to the amount of additional airspace to be protected for turning aircraft.

(2) FL 180 to FL 450 inclusive — *16 miles.*

(3) Above FL 450 — *18 miles.*

d. When the course change at FL 180 and above is 91 degrees through 180 degrees, in addition to additional airspace beyond the turning point specified in c(2) and c(3), protect additional airspace on the overflown side until the aircraft is reestablished on course as follows:

(1) FL 180 to FL 450 inclusive — *27 miles.*

(2) Above FL 450 — *34 miles.*

10-13 INITIAL SEPARATION OF DEPARTURES AND ARRIVALS

a. When aircraft will fly the same course initially, but will fly diverging courses within 5 minutes after takeoff, provide *3 minutes* separation until courses diverge.

10-13a Reference. — Minima on Diverging Courses, 6-10.

b. When aircraft using DME will fly the same course initially, but will fly diverging courses within 15 miles after takeoff, provide *5 miles* separation until courses diverge.

10-13b Reference. — Minima on Diverging Courses, 6-10.

c. Separate aircraft that will fly the same course when the following aircraft will climb through the altitude assigned to the leading aircraft by using a minimum of *5 minutes* until the following aircraft passes through the altitude of the leading aircraft or *10 miles* if both aircraft are using DME.

10-13c Reference. — Minima on Same Course, 6-11.

d. Separate a departing aircraft from an arriving aircraft making an instrument approach to the same airport by permitting a takeoff which differs by at least 45 degrees from the reciprocal of the final approach course until one of the following conditions exists:

10-13d Reference. — Separation Minima, 6-20.

(1) The arriving aircraft reports commencing procedure turn if making a complete instrument approach, or

(2) The arriving aircraft is estimated to be 3 minutes from the airport if making a straight-in approach.

10-14 VISUAL SEPARATION AND VFR

a. Clear an aircraft to maintain "1,000-feet-on-top" in lieu of VFR-on-top.

b. An aircraft may be cleared to maintain "1,000 feet on top" (in lieu of VFR-on-top) or may be issued VFR separation when requested by the pilot except:

10-14 Reference. — VFR-on-Top, 7-20.

(1) In Class A or B airspace.

(2) Within airspace reservations, unless it is a military aircraft operating "at least 1,000 feet on top" or VFR. Such military aircraft may be cleared into or through a military reservation.

10-15 SPECIAL VFR

Authorize Special VFR operations to or from Canadian airports within control zones with the following Canadian Special VFR weather minimums:

10-15 Reference. — Authorization, 7-40; Special VFR, Chapter 7, Section 5.

a. Aircraft other than helicopters:

(1) Ceiling 500 feet and visibility three miles.

(2) Ceiling 600 feet and visibility two miles.

(3) Ceiling 700 feet and visibility one mile.

b. Helicopters: Ceiling 300 feet and visibility three miles.

10-15 Note. — In Canadian airspace pilots do not have to be instrument rated to fly SVFR at night, nor do aircraft have to be equipped for IFR flight.

10-16 APPROACHES

a. Clear aircraft for a "company" instrument approach only if the aircraft is identified on the procedure as one being approved or the pilot otherwise states that approval has been granted for use of the procedure.

10-16a Note. — A Canadian "company" instrument approach procedure is similar to a U.S. "special" instrument approach procedure; i.e., one that is approved for use by specific aircraft or aircraft operators.

10-16a Reference. — Clearance, 4-80.

b. Clear an aircraft for a visual approach in lieu of a contact approach only when the pilot has requested it and the reported ground visibility is at least 1 statute mile. Apply standard separation between such aircraft and other IFR or Special VFR aircraft.

10-16b Note. — In Canada this approach is named "visual approach." Should a Canadian pilot request a visual approach, use the contact approach procedures.

10-16b Reference. — Contact Approach, 7-32. Applicable Canadian Air Regulations.

10-17 LENGTHY DELAY

If an aircraft is expected to be delayed 30 minutes or more at the destination airport:

a. Issue, either directly or through another unit, an expect-approach-clearance time, and

b. Inform the aircraft operator if practicable.

10-17 Note. — Expect-approach-clearance time is defined as the time at which it is expected that an aircraft will be cleared to commence an approach for a landing.

10-18 ALTITUDE FOR DIRECTION OF FLIGHT

Inform an aircraft of the correct altitude for direction of flight when a report from an aircraft maintaining 1,000 on top indicates it is not complying with Canadian Air Regulations.

Phraseology:

1,000 ON TOP CRUISING LEVELS FOR YOUR DIRECTION OF FLIGHT ARE:

From 3,500 feet above the surface up to but not including 12,500 feet MSL, ODD/EVEN ALTITUDES.

10-19 thru 10-29. RESERVED

Section 3. RADAR OPERATION

10-30 RADAR SEPARATION

Apply radar separation between the edges of radar targets (primary/secondary).

10-30 Reference. — Target Separation, 5-71.

10-31 RADAR SEPARATION MINIMA

a. Separate aircraft by the following minima:

10-31a Note. — Paragraph 10-34 specifies increased separation minima required for certain categories of aircraft because of possible effects of wake turbulence.

10-31a Reference. — Application, 5-72.

(1) If less than 40 miles from the antenna site and ASR equipment is used — *3 miles.*

(2) Otherwise — *5 miles,* except

(3) Flight level 600 and above with narrowband radar systems — *10 miles.*

b. Separate aircraft from prominent obstructions shown on the radar scope by a minimum of *5 miles.*

10-31b Reference. — Separation From Obstructions, 5-75.

c. If coordination between controllers concerned has not been effected, separate radar-controlled aircraft from the boundary of the adjacent airspace in which radar separation is also being used by the following minima;

10-31c Reference. — Adjacent Airspace, 5-76.

(1) When control in both areas is based upon the same radar system:

(a) If the boundary is less than 40 miles from the antenna and ASR equipment is used — *1 ½ miles.*

(b) Otherwise — *2 ½ miles.*

(2) When control in each area is based upon different radar systems:

(a) If the boundary is less than 40 miles from the antenna and ASR equipment is used — *3 miles.*

(b) Otherwise — *5 miles.*

(3) In En Route Stage A/DARC, FL 600 and above — 5 miles.

d. Separate radar-controlled aircraft from the boundary of airspace in which nonradar separation is being used by a minimum of *5 miles (3 miles* when the boundary is less than 40 miles from the antenna and ASR equipment is used). In En Route Stage A/DARC, separate by a minimum of *10 miles* at flight level 600 and above.

10-31d Reference. — Adjacent Airspace, 5-76.

e. Radar separation may be applied between a radar-identified aircraft and an IFR aircraft not radar identified when the former is climbing or descending through the altitude of the latter provided:

10-31e Reference. — Application, 5-70.

(1) The airspace in which the separation is applied is not less than 10 miles from the extremity of reliable primary radar coverage provided by the display being used.

(2) Conditions set forth in 5-70b(3) (a), (b), (d), and (e) are met.

10-32 PASSING — OPPOSITE COURSES

Except when using a full digital system, vertical separation between aircraft on opposite courses only may be discontinued when the following conditions are met:

10-32 Reference. — Passing or Diverging, 5-73.

a. You observe that they have passed each other.

b. Their tracks are monitored to assure that their primary targets or beacon control slashes will not touch.

10-33 CLASS F (SPECIAL USE) AIRSPACE

Separate aircraft from the boundary of restricted airspace, military flying areas, active danger, and active alert areas by the following minima:

10-33 Reference. — Adjacent Airspace, 5-76.

a. If less than 40 miles from the antenna site and ASR equipment is used — *3 miles.*

b. Otherwise — *5 miles.*

10-34 WAKE TURBULENCE SEPARATION MINIMA

Apply the following separation minima between a preceding IFR/VFR aircraft and an aircraft vectored directly behind it and at less than 1,000 feet below:

a. Heavy behind Heavy — *4 miles.*

b. Large behind Heavy — *5 miles.*

c. Small behind Large — *4 miles.*

d. Small behind Heavy — *6 miles.*

10-34 Note. — Canadian air traffic control procedures require identical radar separation standards for wake turbulence purposes in the en route and departure phases of flight as well as in the arrival phase. Their categories of aircraft are defined as HEAVY, MEDIUM, and LIGHT which are the same as U.S. classes HEAVY, LARGE, and SMALL.

10-35 RADAR ARRIVALS

TERMINAL

All conditions of 7-31 are applicable except the minima visibility requirement is 5 statute miles.

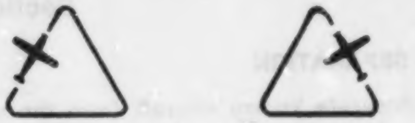
10-35 Reference. — Visual Approaches, 7-31.

10-36 EMERGENCY

a. Consider that an aircraft is in distress or experiencing an emergency if you observe:

(1) An SSR reply on code 7500, 7600 or 7700; or

(2) A triangle distress pattern



Right-hand pattern,
no transmitter

Left-hand pattern,
no transmitter
and receiver

Illustration

b. Take action to separate all other aircraft from a nonidentified aircraft that is replying on code 7600 or 7700.

10-37 thru 10-49. RESERVED

Section 4. FUEL DUMPING

10-50 SEPARATION

a. Separate known aircraft from the aircraft dumping fuel by one of the following:

10-50a Reference. — Separation Minima, 8-53.

(1) 3,000 feet above it.

(2) 10 miles from the fuel dumping area.

b. Provide separation for 15 minutes after fuel dumping has been completed.

10-51 ADVISORIES

a. When information is received that an aircraft plans to dump fuel, inform other controllers and facilities which might be concerned. Facilities concerned shall broadcast an advisory on appropriate radio frequencies at 3-minute intervals beginning at a reasonable time before the fuel dumping is to begin and continuing until 15 minutes after fuel dumping stops.

Phraseology:

ADVISORY TO AIRCRAFT NOT ON A-T-C CLEARANCE, (type of aircraft) DUMPING FUEL AT (altitude), BEGINNING AT (position), CONTINUING FOR (number) MILES/MINUTES ON (course). AVOID FLIGHT BELOW (altitude 3,000 feet above fuel dumping altitude) WITHIN TEN NAUTICAL MILES OF FUEL DUMPING AREA.

b. Broadcast a termination advisory at the end of the advisory period.

Phraseology:

ADVISORY TO ALL CONCERNED (type of aircraft) FUEL DUMP TERMINATED.

10-51a and b Reference. — Information Dissemination, 8-54.

APPENDIX A

PILOT/CONTROLLER GLOSSARY

This Glossary was compiled to promote a common understanding of the terms used in the Air Traffic Control system. It includes those terms which are intended for pilot/controller communications. Those terms most frequently used in pilot/controller communications are printed in ***bold italics***. The definitions are primarily defined in an operational sense applicable to both users and operators of the National Airspace System. Use of the Glossary will preclude any misunderstandings concerning the system's design, function, and purpose.

Because of the international nature of flying, terms used in the "Lexicon," published by the International Civil Aviation Organization (ICAO), are included when they differ from FAA definitions. These terms are *italicized*. For the reader's convenience, there are also cross references to related terms in other parts of the Glossary and to other documents, such as the Federal Aviation Regulations (FARs) and the Airman's Information Manual (AIM).

This Glossary will be revised as necessary to maintain a common understanding of the system.

ABBREVIATED IFR FLIGHT PLANS— An authorization by ATC requiring pilots to submit only that information needed for the purpose of ATC. It includes only a small portion of the usual IFR flight plan information. In certain instances, this may be only aircraft identification, location, and pilot request. Other information may be requested if needed by ATC for separation/control purposes. It is frequently used by aircraft which are airborne, desire an instrument approach, or by aircraft on the ground which desire a climb to VFR on top. (See VFR-ON-TOP) (Refer to AIM)

ABEAM— An aircraft is "abeam" a fix, point or object when that fix, point or object is approximately 90 degrees to the right or left of the aircraft track. Abeam indicates a general position rather than a precise point.

ABORT— To terminate a preplanned aircraft maneuver; e.g., an aborted takeoff.

ACKNOWLEDGE— Let me know that you have received and understand my message.

ACROBATIC FLIGHT— An intentional maneuver involving an abrupt change in an aircraft's attitude, an abnormal attitude, or abnormal acceleration, not necessary for normal flight. (Refer to FAR Part 91)

*ICAO—ACROBATIC FLIGHT—*Maneuvers intentionally performed by an aircraft involving an abrupt change in its attitude, an abnormal attitude, or an abnormal variation in speed.

ADDITIONAL SERVICES— Advisory information provided by ATC which includes but is not limited to the following:

1. Traffic advisories.
2. Vectors, when requested by the pilot, to assist aircraft receiving traffic advisories to avoid observed traffic.
3. Altitude deviation information of 300 feet or more from an assigned altitude as observed on a verified (reading correctly) automatic altitude readout (Mode C).
4. Advisories that traffic is no longer a factor.
5. Weather and chaff information.
6. Weather assistance.
7. Bird activity information.
8. Holding pattern surveillance.

Additional services are provided to the extent possible contingent only upon the controller's capability to fit them into the performance of higher priority duties and on the basis of limitations of the radar, volume of traffic, frequency congestion and controller workload. The controller has complete discretion for determining if he is able to provide or continue to provide a service in a particular case. The controller's reason not to provide or continue to provide a service in a particular case is not subject to question by the pilot and need not be made known to him. (See Traffic Advisories) (Refer to AIM)

ADMINISTRATOR— The Federal Aviation Administrator or any person to whom he has delegated his authority in the matter concerned.

ADVISE INTENTIONS— Tell me what you plan to do.

ADVISORY— Advice and information provided to assist pilots in the safe conduct of flight and aircraft movement. (See Advisory Service)

ADVISORY FREQUENCY— The appropriate frequency to be used for Airport Advisory Service. (See Airport Advisory Service and UNICOM) (Refer to Advisory Circular No. 90-42 and AIM)

ADVISORY SERVICE— Advice and information provided by a facility to assist pilots in the safe conduct of flight and aircraft movement. (See Airport Advisory Service, Traffic Advisories, Safety Advisories, Additional Services, Radar Advisory, En Route Flight Advisory Service) (Refer to AIM)

AERIAL REFUELING/IN-FLIGHT REFUELING— A procedure used by the military to transfer fuel from one aircraft to another during flight. (Refer to VFR/IFR Wall Planning Charts).

AERODROME— A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and movement of aircraft.

AERONAUTICAL BEACON— A visual NAVAID displaying flashes of white and/or colored light to indicate the location of an airport, a heliport, a landmark, a certain point of a Federal airway in mountainous terrain, or an obstruction. (See Airport Rotating Beacon) (Refer to AIM)

AERONAUTICAL CHART— A map used in air navigation containing all or part of the following: Topographic features, hazards and obstructions, navigation aids, navigation routes, designated airspace, and airports. Commonly used aeronautical charts are:

1. Sectional Charts—1:500,000—Designed for visual navigation of slow or medium speed aircraft. Topographic information on these charts features the portrayal of relief, and a judicious selection of visual check points for VFR flight. Aeronautical information includes visual and radio aids to navigation, airports, controlled airspace, restricted areas, obstructions and related data.
2. VFR Terminal Area Charts—1:250,000—Depict Terminal Control Area (TCA) airspace which provides for the control or segregation of all the aircraft within the TCA. The chart depicts topographic information and aeronautical information which includes visual and radio aids to navigation, airports, controlled airspace, restricted areas, obstructions, and related data.
3. World Aeronautical Charts (WAC)—1:1,000,000—Provide a standard series of aeronautical charts covering land areas of the world at a size and scale convenient for navigation by moderate speed aircraft. Topographic information includes cities and towns, principal roads, railroads, distinctive landmarks, drainage, and relief. Aeronautical information includes visual and radio aids to navigation, airports, airways, restricted areas, obstructions and other pertinent data.
4. En Route Low Altitude Charts—Provide aeronautical information for en route instrument navigation (IFR) in the low altitude stratum. Information includes the portrayal of airways, limits of controlled airspace, position identification and frequencies of radio aids, selected airports, minimum en route and minimum obstruction clearance altitudes, airway distances, reporting points, restricted areas, and related data. Area charts which are a part of this series furnish terminal data at a larger scale in congested areas.
5. En Route High Altitude Charts—Provide aeronautical information for en route instrument navigation (IFR) in the high altitude stratum. Information includes the portrayal of jet routes, identification and frequencies of radio aids, selected airports, distances, time zones, special use airspace, and related information.
6. Instrument Approach Procedures (IAP) Charts—Portray the aeronautical data which is required to execute an instrument approach to an airport. These charts depict the procedures, including all related data, and the airport diagram. Each procedure is designated for use with a specific type of electronic navigation system including NDB, TACAN, VOR, ILS, and RNAV. These charts are identified by the type of navigational aid(s) which provide final approach guidance.
7. Standard Instrument Departure (SID) Charts—Designed to expedite clearance delivery and to facilitate transition between takeoff and en route operations. Each SID procedure is presented as a separate chart and may serve a single airport or more than one airport in a given geographical location.
8. Standard Terminal Arrival (STAR) Charts— Designed to expedite air traffic control arrival route procedures and to facilitate transition between en route and instrument approach operations. Each STAR procedure is presented as a separate chart and may serve a single airport or more than one airport in a given geographical location.
9. Airport Taxi Charts--Designed to expedite the efficient and safe flow of ground traffic at an airport. These charts are identified by the official airport name; e.g., Washington National Airport.

*ICAO—AERONAUTICAL CHART—*A representation of a portion of the earth, its culture and relief, specifically designated to meet the requirements of air navigation.

AFFIRMATIVE— Yes.

AIR CARRIER DISTRICT OFFICE/ACDO— An FAA field office serving an assigned geographical area, staffed with Flight Standards personnel serving the aviation industry and the general public on matters related to the certification and operation of scheduled air carriers and other large aircraft operations.

AIRCRAFT— Device/s that are used or intended to be used for flight in the air, and when used in air traffic control terminology, may include the flight crew.

*ICAO-AIRCRAFT—*Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

AIRCRAFT APPROACH CATEGORY— A grouping of aircraft based on a speed of 1.3 times the stall speed in the landing configuration at maximum gross landing weight. An aircraft shall fit in only one category. If it is necessary to maneuver at speeds in excess of the upper limit of a speed range for a category, the minimums for the next higher category should be used. For example, an aircraft which falls in Category

A, but is circling to land at a speed in excess of 91 knots, should use the approach Category B minimums when circling to land. The categories are as follows:

1. Category A—Speed less than 91 knots.
2. Category B—Speed 91 knots or more but less than 121 knots.
3. Category C—Speed 121 knots or more but less than 141 knots.
4. Category D—Speed 141 knots or more but less than 166 knots.
5. Category E—Speed 166 knots or more.

(Refer to FAR Parts 1 and 97)

AIRCRAFT CLASSES— For the purposes of Wake Turbulence Separation Minima, ATC classifies aircraft as Heavy, Large, and Small as follows:

1. Heavy—Aircraft capable of takeoff weights of 300,000 pounds or more whether or not they are operating at this weight during a particular phase of flight.
2. Large—Aircraft of more than 12,500 pounds, maximum certificated takeoff weight, up to 300,000 pounds.
3. Small—Aircraft of 12,500 pounds or less maximum certificated takeoff weight. (Refer to AIM)

AIR DEFENSE EMERGENCY— A military emergency condition declared by a designated authority. This condition exists when an attack upon the continental U.S., Alaska, Canada, or U.S. installations in Greenland by hostile aircraft or missiles is considered probable, is imminent, or is taking place. (Refer to AIM)

AIR DEFENSE IDENTIFICATION ZONE/ADIZ— The area of airspace over land or water, extending upward from the surface, within which the ready identification, the location, and the control of aircraft are required in the interest of national security.

1. Domestic Air Defense Identification Zone— An ADIZ within the United States along an international boundary of the United States.
2. Coastal Air Defense Identification Zone— An ADIZ over the coastal waters of the United States.
3. Distant Early Warning Identification Zone (DEWIZ)— An ADIZ over the coastal waters of the State of Alaska.

ADIZ locations and operating and flight plan requirements for civil aircraft operations are specified in FAR Part 99. (Refer to AIM)

AIRMAN'S INFORMATION MANUAL/AIM— A publication containing Basic Flight Information and ATC Procedures designed primarily as a pilot's instructional manual for use in the National Airspace System of the United States.

ICAO-AERONAUTICAL INFORMATION PUBLICATION—A publication issued by or with the authority of a state and containing aeronautical information of a lasting character essential to air navigation.

AIRMET **/WA/AIRMAN'S METEOROLOGICAL INFORMATION—** In-flight weather advisories issued only to amend the area forecast concerning weather phenomena which are of operational interest to all aircraft and potentially hazardous to aircraft having limited capability because of lack of equipment, instrumentation, or pilot qualifications. AIRMET's concern weather of less severity than that covered by SIGMET's or Convective SIGMET's. AIRMET's cover moderate icing, moderate turbulence, sustained winds of 30 knots or more at the surface, widespread areas of ceilings less than 1,000 feet and/or visibility less than 3 miles, and extensive mountain obscurement. (See SIGMET and Convective SIGMET) (Refer to AIM)

AIR NAVIGATION FACILITY— Any facility used in, available for use in, or designed for use in, aid of air navigation, including landing areas, lights, any apparatus or equipment for disseminating weather information, for signaling, for radio-directional finding, or for radio or other electrical communication, and any other structure or mechanism having a similar purpose for guiding or controlling flight in the air or the landing and take-off of aircraft. (See Navigational Aid)

AIRPORT— An area on land or water that is used or intended to be used for the landing and takeoff of aircraft and includes its buildings and facilities, if any.

AIRPORT ADVISORY AREA— The area within ten miles of an airport without a control tower or where the tower is not in operation, and on which a Flight Service Station is located. (See Airport Advisory Service) (Refer to AIM)

AIRPORT ADVISORY SERVICE/AAS— A service provided by flight service stations located at airports not serviced by a control tower. This service consists of providing information to arriving and departing aircraft concerning wind direction and speed, favored runway, altimeter setting, pertinent known traffic, pertinent known field conditions, airport taxi routes and traffic patterns, and authorized instrument approach procedures. This information is advisory in nature and does not constitute an ATC clearance. (See Airport Advisory Area)

AIRPORT ELEVATION/FIELD ELEVATION— The highest point of an airport's usable runways measured in feet from mean sea level. (See Touchdown Zone Elevation)

ICAO-AERODROME ELEVATION—The elevation of the highest point of the landing area.

AIRPORT/FACILITY DIRECTORY— A publication designed primarily as a pilot's operational manual containing all airports, seaplane bases, and heliports open to the public including communications data, navigational facilities, and certain special notices and procedures. This publication is issued in seven volumes according to geographical area.

AIRPORT INFORMATION DESK/AID— An airport unmanned facility designed for pilot self-service briefing, flight planning, and filing of flight plans. (Refer to AIM)

AIRPORT LIGHTING— Various lighting aids that may be installed on an airport. Types of airport lighting include:

1. Approach Light System/ALS—An airport lighting facility which provides visual guidance to landing aircraft by radiating light beams in a directional pattern by which the pilot aligns the aircraft with the extended centerline of the runway on his final approach for landing.

   Condenser-Discharge Sequential Flashing Lights/Sequenced Flashing Lights may be installed in conjunction with the ALS at some airports. Types of Approach Light Systems are:

   a. ALSF-I—Approach Light System with Sequenced Flashing Lights in ILS Cat-I configuration.
   b. ALSF-II—Approach Light System with Sequenced Flashing Lights in ILS Cat-II configuration.
   c. SSALF—Simplified Short Approach Light System with Sequenced Flashing Lights.
   d. SSALR—Simplified Short Approach Light System with Runway Alignment Indicator Lights.
   e. MALSF—Medium Intensity Approach Light System with Sequenced Flashing Lights.
   f. MALSR—Medium Intensity Approach Light System with Runway Alignment Indicator Lights.
   g. LDIN—Sequenced Flashing Lead-in Lights.
   h. RAIL—Runway Alignment Indicator Lights (Sequenced Flashing Lights which are installed only in combination with other light systems).
   i. ODALS—Omnidirectional Approach Lighting System consists of seven omnidirectional flashing lights located in the approach area of a nonprecision runway. Five lights are located on the runway centerline extended with the first light located 300 feet from the threshold and extending at equal intervals up to 1,500 feet from the threshold. The other two lights are located, one on each side of the runway threshold, at a lateral distance of 40 feet from the runway edge, or 75 feet from the runway edge when installed on a runway equipped with a VASI. (Refer to Order 6850.2A)

2. Runway Lights/Runway Edge Lights—Lights having a prescribed angle of emission used to define the lateral limits of a runway. Runway lights are uniformly spaced at intervals of approximately 200 feet, and the intensity may be controlled or preset.

3. Touchdown Zone Lighting—Two rows of tranverse light bars located symmetrically about the runway centerline normally at 100 foot intervals. The basic system extends 3,000 feet along the runway.

4. Runway Centerline Lighting—Flush centerline lights spaced at 50-foot intervals beginning 75 feet from the landing threshold and extending to within 75 feet of the opposite end of the runway.

5. Threshold Lights—Fixed green lights arranged symmetrically left and right of the runway centerline, identifying the runway threshold.

6. Runway End Identifier Lights/REIL—Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.

7. Visual Approach Slope Indicator/VASI— An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that he is "on path" if he sees red/white, "above path' if white/white, and "below path" if red/red. Some airports serving large aircraft have three-bar VASIs which provide two visual glide paths to the same runway.

8. Boundary Lights—Lights defining the perimeter of an airport or landing area. (Refer to AIM)

AIRPORT MARKING AIDS— Markings used on runway and taxiway surfaces to identify a specific runway, a runway threshold, a centerline, a hold line, etc. A runway should be marked in accordance with its present usage such as:

1. Visual.

2. Nonprecision instrument.

3. Precision instrument. (Refer to AIM)

AIRPORT ROTATING BEACON— A visual NAVAID operated at many airports. At civil airports, alternating white and green flashes indicate the location of the airport. At military airports, the beacons flash alternately white and green, but are differentiated from civil beacons by dualpeaked (two quick) white flashes between the green flashes. (See Special VFR Operations, Instrument Flight Rules) (Refer to AIM, Rotating Beacons)

ICAO-AERODROME BEACON—Aeronautical beacon used to indicate the location of an aerodrome.

AIRPORT SURFACE DETECTION EQUIPMENT/ASDE— Radar equipment specifically designed to detect all principal features on the surface of an airport including aircraft and vehicular traffic and to present the entire image on a radar indicator console in the control tower. Used to augment visual observation by tower personnel of aircraft and/or vehicular movements on runways and taxiways.

AIRPORT SURVEILLANCE RADAR/ASR— Approach control radar used to detect and display an aircraft's position in the terminal area. ASR provides range and azimuth information but does not provide elevation data. Coverage of the ASR can extend up to 60 miles.

AIRPORT TRAFFIC AREA— Unless otherwise specifically designated in FAR Part 93, that airspace within a horizontal radius of 5 statute miles from the geographical center of any airport at which a control tower is operating, extending from the surface up to, but not including, an altitude of 3,000 feet above the elevation of an airport. Unless otherwise authorized or required by ATC, no person may operate an aircraft within an airport traffic area except for the purpose of landing at, or taking off from, an airport within that area. ATC authorizations may be given as individual approval of specific operations or may be contained in written agreements between airport users and the tower concerned. (Refer to FAR Parts 1 and 91).

AIRPORT TRAFFIC CONTROL SERVICE— A service provided by a control tower for aircraft operating on the movement area and in the vicinity of an airport. (See Movement Area, Tower)

ICAO-AERODROME CONTROL SERVICE—Air traffic control service for aerodrome traffic.

AIR ROUTE SURVEILLANCE RADAR/ARSR— Air route traffic control center (ARTCC) radar used primarily to detect and display an aircraft's position while en route between terminal areas. The ARSR enables controllers to provide radar air traffic control service when aircraft are within the ARSR coverage. In some instances, ARSR may enable an ARTCC to provide terminal radar services similar to but usually more limited than those provided by a radar approach control.

AIR ROUTE TRAFFIC CONTROL CENTER/ARTCC— A facility established to provide air traffic control service to aircraft operating on IFR flight plans within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft. (See NAS Stage A, En Route Air Traffic Control Service) (Refer to AIM)

AIRSPEED— The speed of an aircraft relative to its surrounding air mass. The unqualified term "airspeed" means one of the following:

1. Indicated Airspeed—The speed shown on the aircraft airspeed indicator. This is the speed used in pilot/controller communications under the general term "airspeed." (Refer to FAR Part 1)
2. True Airspeed—The airspeed of an aircraft relative to undisturbed air. Used primarily in flight planning and en route portion of flight. When used in pilot/controller communications, it is referred to as "true airspeed" and not shortened to "airspeed."

AIRSTART— The starting of an aircraft engine while the aircraft is airborne, preceded by engine shutdown during training flights or by actual engine failure.

AIR TAXI— Used to describe a helicopter/VTOL aircraft movement conducted above the surface but normally not above 100 feet AGL. The aircraft may proceed either via hover taxi or flight at speeds more than 20 knots. The pilot is solely responsible for selecting a safe airspeed/altitude for the operation being conducted. (See Hover Taxi) (Refer to AIM)

AIR TRAFFIC— Aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.

ICAO—AIR TRAFFIC—All aircraft in flight or operating on the maneuvering area of an aerodrome.

AIR TRAFFIC CLEARANCE/ATC CLEARANCE— An authorization by air traffic control, for the purpose of preventing collision between known aircraft, for an aircraft to proceed under specified traffic conditions within controlled airspace. (See ATC Instructions)

ICAO—AIR TRAFFIC CONTROL CLEARANCE—Authorization for an aircraft to proceed under conditions specified by an air traffic control unit.

AIR TRAFFIC CONTROL/ATC— A service operated by appropriate authority to promote the safe, orderly and expeditious flow of air traffic.

ICAO—AIR TRAFFIC CONTROL SERVICE—A service provided for the purpose of:

1. Preventing collisions:
    a. Between aircraft, and
    b. On the maneuvering area between aircraft and obstructions, and
2. Expediting and maintaining an orderly flow of air traffic.

AIR TRAFFIC CONTROL SERVICE— (See Air Traffic Control)

AIR TRAFFIC CONTROL SPECIALIST/CONTROLLER— A person authorized to provide air traffic control service. (See Air Traffic Control, Flight Service Station)

ICAO—CONTROLLER—A person authorized to provide air traffic control services.

AIR TRAFFIC CONTROL COMMAND CENTER/ATCCC— An air traffic service facility consisting of four operational units.

1. Central Flow Control Function/CFCF—Responsible for coordination and approval of all major intercenter flow control restrictions on a system basis in order to obtain maximum utilization of the airspace. (See Fuel Advisory Departure, Quota Flow Control)
2. Central Altitude Reservation Function/CARF—Responsible for coordinating, planning and approving special user requirements under the Altitude Reservation (ALTRV) concept. (See Altitude Reservation)
3. Airport Reservation Office/ARO—Responsible for approving IFR flights at designated high density traffic airports (John F. Kennedy, LaGuardia, O'Hare and Washington National) during specified hours. (Refer to FAR Part 93 and Airport/Facility Directory)
4. ATC Contingency Command Post—A facility which enables the FAA to manage the ATC system when significant portions of the system's capabilities have been lost or are threatened.

AIRWAY BEACON— Used to mark airway segments in remote mountain areas. The light flashes Morse Code to identify the beacon site. (Refer to AIM)

AIRWAY/FEDERAL AIRWAY— A control area or portion thereof established in the form of a corridor, the centerline of which is defined by radio navigational aids. (Refer to FAR Part 71, AIM)

ICAO-AIRWAY—A control area or portion thereof established in the form of corridor equipped with radio navigational aids.

ALERT AREA— (See Special Use Airspace)

ALERT NOTICE/ALNOT— A message sent by a Flight Service Station (FSS) or Air Route Traffic Control Center (ARTCC) that requests an extensive communication search for overdue, unreported, or missing aircraft.

ALPHANUMERIC DISPLAY/DATA BLOCK— Letters and numerals used to show identification, altitude, beacon code, and other information concerning a target on a radar display. (See Automated Radar Terminal Systems, NAS Stage A)

ALTERNATE AIRPORT— An airport at which an aircraft may land if a landing at the intended airport becomes inadvisable.

ICAO-ALTERNATE AERODROME—An aerodrome specified in the flight plan to which a flight may proceed when it becomes inadvisable to land at the aerodrome of intended landing.

ALTIMETER SETTING— The barometric pressure reading used to adjust a pressure altimeter for variations in existing atmospheric pressure or to the standard altimeter setting (29.92). (Refer to FAR Part 91, AIM)

ALTITUDE— The height of a level, point, or object measured in feet Above Ground Level (AGL) or from Mean Sea Level (MSL). (See Flight Level)

1. MSL Altitude—Altitude expressed in feet measured from mean sea level.
2. AGL Altitude—Altitude expressed in feet measured above ground level.
3. Indicated Altitude—The altitude as shown by an altimeter. On a pressure or barometric altimeter it is altitude as shown uncorrected for instrument error and uncompensated for variation from standard atmospheric conditions.

ICAO-ALTITUDE—The vertical distance of a level, a point or an object considered as a point, measured from mean sea level.

ALTITUDE READOUT/AUTOMATIC ALTITUDE REPORT— An aircraft's altitude, transmitted via the Mode C transponder feature, that is visually displayed in 100-foot increments on a radar scope having readout capability. (See Automated Radar Terminal Systems, NAS Stage A, Alphanumeric Display) (Refer to AIM)

ALTITUDE RESERVATION/ALTRV— Airspace utilization under prescribed conditions normally employed for the mass movement of aircraft or other special user requirements which cannot otherwise be accomplished. ALTRVs are approved by the appropriate FAA facility. (See Air Traffic Control Command Center)

ALTITUDE RESTRICTION— An altitude or altitudes stated in the order flown, which are to be maintained until reaching a specific point or time. Altitude restrictions may be issued by ATC due to traffic, terrain or other airspace considerations.

ALTITUDE RESTRICTIONS ARE CANCELLED— Adherence to previously imposed altitude restrictions is no longer required during a climb or descent.

APPROACH CLEARANCE— Authorization by ATC for a pilot to conduct an instrument approach. The type of instrument approach for which clearance and other pertinent information is provided in the approach clearance when required. (See Instrument Approach Procedure, Cleared for Approach) (Refer to AIM and FAR Part 91)

APPROACH CONTROL FACILITY— A terminal ATC facility that provides approach control service in a terminal area. (See Approach Control Service, Radar Approach Control Facility.

APPROACH CONTROL SERVICE— Air traffic control service provided by an approach control facility for arriving and departing VFR/IFR aircraft and, on occasion, en route aircraft. At some airports not served by an approach control facility, the ARTCC provides limited approach control service. (Refer to AIM)

ICAO—APPROACH CONTROL SERVICE—Air traffic service for arriving or departing controlled flights.

APPROACH GATE— The point on the final approach course which is 1 mile from the final approach fix on the side away from the airport or 5 miles from landing threshold, whichever is farther from the landing threshold. This is an imaginary point used within ATC as a basis for final approach course interception for aircraft being vectored to the final approach course.

APPROACH LIGHT SYSTEM— (See Airport Lighting)

APPROACH SEQUENCE— The order in which aircraft are positioned while on approach or awaiting approach clearance. (See Landing Sequence)

ICAO—APPROACH SEQUENCE—The order in which two or more aircraft are cleared to approach to land at the aerodrome.

APPROACH SPEED— The recommended speed contained in aircraft manuals used by pilots when making an approach to landing. This speed will vary for different segments of an approach as well as for aircraft weight and configuration.

APRON/RAMP— A defined area on an airport or heliport intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking, or maintenance. With regard to seaplanes, a ramp is used for access to the apron from the water.

ICAO—APRON—A defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking or maintenance.

ARC— The track over the ground of an aircraft flying at a constant distance from a navigational aid by reference to distance measuring equipment (DME).

AREA NAVIGATION/RNAV— A method of navigation that permits aircraft operations on any desired course within the coverage of station-referenced navigation signals or within the limits of self-contained system capability. (Refer to AIM, FAR Part 71)

1. Area Navigation Low Route—An area navigation route within the airspace extending upward from 1,200 feet above the surface of the earth to, but not including 18,000 feet MSL.
2. Area Navigation High Route—An area navigation route within the airspace extending upward from and including 18,000 feet MSL to flight level 450.
3. Random Area Navigation Routes/Random RNAV Routes—Direct routes, based on area navigation capability, between waypoints defined in terms of latitude/longitude coordinates, degree/distance fixes, or offset from published or established routes/airways at a specified distance and direction.
4. RNAV Waypoint/W/P—A predetermined geographical position used for route or instrument approach definition or progress reporting purposes that is defined relative to a VORTAC station position/or in terms of latitude/longitude coordinates.

ICAO—AREA NAVIGATION/RNAV—A method of navigation which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids or a combination of these.

ARMY AVIATION FLIGHT INFORMATION BULLETIN/USAFIB— A bulletin that provides air operation data covering Army, National Guard, and Army Reserve aviation activities.

ARRESTING SYSTEM— A safety device consisting of two major components, namely, engaging or catching devices, and energy absorption devices for the purpose of arresting both tail hook and/or non-tail hook equipped aircraft. It is used to prevent aircraft from overrunning runways when the aircraft cannot be stopped after landing or during aborted takeoff. Arresting systems have various names; e.g., arresting gear, hook, device, wire barrier cable. (See Abort) (Refer to AIM)

ARRIVAL TIME— The time an aircraft touches down on arrival.

ARTCC— (See Air Route Traffic Control Center)

ASR APPROACH— (See Surveillance Approach)

ATC ADVISES— Used to prefix a message of noncontrol information when it is relayed to an aircraft by other than an air traffic controller. (See Advisory)

ATC ASSIGNED AIRSPACE/ATCAA— Airspace of defined vertical/lateral limits, assigned by ATC, for the purpose of providing air traffic segregation between the specified activities being conducted within the assigned airspace and other IFR air traffic. (See Military Operations Area, Alert Area)

ATC CLEARANCE— (See Air Traffic Clearance)

ATC CLEARS— Used to prefix an ATC clearance when it is relayed to an aircraft by other than an air traffic controller.

ATC INSTRUCTIONS— Directives issued by air traffic control for the purpose of requiring a pilot to take specific actions; e.g., "Turn left heading two five zero," "Go around," "Clear the runway." (Refer to FAR Part 91)

ATCRBS— (See Radar)

ATC REQUESTS— Used to prefix an ATC request when it is relayed to an aircraft by other than an air traffic controller.

AUTOMATED RADAR TERMINAL SYSTEMS/ARTS— The generic term for the ultimate in functional capability afforded by several automation systems. Each differs in functional capabilities and equipment. ARTS plus a suffix roman numeral denotes a specific system. A following letter indicates a major modification to that system. In general, an ARTS displays for the terminal controller aircraft identification, flight plan data, other flight associated information, e.g., altitude and speed, and aircraft position symbols in conjunction with his radar presentation. Normal radar co-exists with the alphanumeric display. In addition to enhancing visualization of the air traffic situation, ARTS facilitate intra/inter-facility transfer and coordination of flight information. These capabilities are enabled by specially designed computers and subsystems tailored to the radar and communications equipments and operational requirements of each automated facility. Modular design permits adoption of improvements in computer software and electronic technologies as they become available while retaining the characteristics unique to each system.

1. ARTS II—A programmable non-tracking, computer aided display subsystem capable of modular expansion. ARTS II systems provide a level of automated air traffic control capability at terminals having low to medium activity. Flight identification and altitude may be associated with the display of secondary radar targets. Also, flight plan information may be exchanged between the terminal and ARTCC.
2. ARTS III—The Beacon Tracking Level (BTL) of the modular programmable automated radar terminal system in use at medium to high activity terminals. ARTS III detects, tracks and predicts secondary radar derived aircraft targets. These are displayed by means of computer-generated symbols and alphanumeric characters depicting flight identification, aircraft altitude, ground speed and flight plan data. Although it does not track primary targets, they are displayed coincident with the secondary radar as well as the symbols and alphanumerics. The system has the capability of communicating with ARTCCs and other ARTS III facilities.

3. ARTS IIIA—The Radar Tracking and Beacon Tracking Level (RT&BTL) of the modular, programmable automated radar terminal system. ARTS IIIA detects, tracks and predicts primary as well as secondary radar-derived aircraft targets. This more sophisticated computer-driven system upgrades the existing ARTS III system by providing improved tracking, continuous data recording and fail-soft capabilities.

AUTOMATIC ALTITUDE REPORTING— That function of a transponder which responds to Mode C interrogations by transmitting the aircraft's altitude in 100-foot increments.

AUTOMATIC CARRIER LANDING SYSTEM/ ACLS— U.S. Navy final approach equipment consisting of precision tracking radar coupled to a computer data link to provide continuous information to the aircraft, monitoring capability to the pilot and a backup approach system.

AUTOMATIC DIRECTION FINDER/ADF— An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum. (See Bearing, Nondirectional Beacon)

AUTOMATIC TERMINAL INFORMATION SERVICE/ATIS— The continuous broadcast of recorded noncontrol information in selected terminal areas. Its purpose is to improve controller effectiveness and to relieve frequency congestion by automating the repetitive transmission of essential but routine information, e.g.,"Los Angeles information Alfa. One three zero zero Greenwich. Weather, measured ceiling two thousand overcast, visibility three, haze, smoke, temperature seven one, dew point five seven, wind two five zero at five, altimeter two niner niner six. I-L-S Runway Two Five Left approach in use, Runway Two Five Right closed, advise you have Alfa." (Refer to AIM)

ICAO—AUTOMATIC TERMINAL INFORMATION SERVICE—The provision of current, routine information to arriving and departing aircraft by means of continuous and repetitive broadcasts throughout the day or a specified portion of the day.

AUTOROTATION— A rotorcraft flight condition in which the lifting rotor is driven entirely by action of the air when the rotorcraft is in motion.

1. Autorotative Landing/Touchdown Autorotation—Used by a pilot to indicate that he will be landing without applying power to the rotor.
2. Low Level Autorotation—Commences at an altitude well below the traffic pattern, usually below 100 feet AGL and is used primarily for tactical military training.
3. 180 degrees Autorotation—Initiated from a downwind heading and is commenced well inside the normal traffic pattern. "Go around" may not be possible during the latter part of this maneuver.

AVIATION WEATHER SERVICE— A service provided by the National Weather Service (NWS) and FAA which collects and disseminates pertinent weather information for pilots, aircraft operators, and ATC. Available aviation weather reports and forecasts are displayed at each NWS office and FAA FSS. (See En Route Flight Advisory Service, Transcribed Weather Broadcast, Weather Advisory, Pilots Automatic Telephone Weather Answering Service) (Refer to AIM)

BASE LEG— (See Traffic Pattern)

BEACON— (See Radar, Nondirectional Beacon, Marker Beacon, Airport Rotating Beacon, Aeronautical Beacon, Airway Beacon))

BEARING— The horizontal direction to or from any point, usually measured clockwise from true north, magnetic north, or some other reference point, through 360 degrees. (See Nondirectional Beacon)

BELOW MINIMUMS— Weather conditions below the minimums prescribed by regulation for the particular action involved; e.g., landing minimums, takeoff minimums.

BLAST FENCE— A barrier that is used to divert or dissipate jet or propeller blast.

BLIND SPEED— The rate of departure or closing of a target relative to the radar antenna at which cancellation of the primary radar target by moving target indicator (MTI) circuits in the radar equipment causes a reduction or complete loss of signal.

ICAO—BLIND VELOCITY—The radial velocity of a moving target such that the target is not seen on primary radars fitted with certain forms of fixed echo suppression.

BLIND SPOT/BLIND ZONE— An area from which radio transmissions and/or radar echoes cannot be received. The term is also used to describe portions of the airport not visible from the control tower.

BOUNDARY LIGHTS— (See Airport Lighting)

BRAKING ACTION (GOOD, FAIR, POOR, OR NIL)— A report of conditions on the airport movement area providing a pilot with a degree/quality of braking that he might expect. Braking action is reported in terms of good, fair, poor, or nil. (See Runway Condition Reading)

BRAKING ACTION ADVISORIES— When tower controllers have received runway braking action reports which include the terms "poor" or "nil," or whenever weather conditions are conducive to deteriorating or rapidly changing runway braking conditions, the tower will include on the ATIS broadcast the statement, "BRAKING ACTION ADVISORIES ARE IN EFFECT." During the time Braking Action Advisories are in effect, ATC will issue the latest braking action report for the runway in use to each arriving and departing aircraft. Pilots should be prepared for deteriorating braking conditions and should request current runway condition information if not volunteered by controllers. Pilots should also be prepared to provide a descriptive runway condition report to controllers after landing.

BROADCAST— Transmission of information for which an acknowledgement is not expected.

*ICAO—BROADCAST—*A transmission of information relating to air navigation that is not addressed to a specific station or stations.

CALL UP— Initial voice contact between a facility and an aircraft, using the identification of the unit being called and the unit initiating the call. (Refer to AIM)

CARDINAL ALTITUDES OR FLIGHT LEVELS— "Odd" or "Even" thousand-foot altitudes or flight levels; e.g., 5,000, 6,000, 7,000, FL 250, FL 260, FL 270. (See Altitude, Flight Levels)

CEILING— The heights above the earth's surface of the lowest layer of clouds or obscuring phenomena that is reported as "broken," "overcast," or "obscuration," and not classified as "thin" or "partial".

*ICAO—CEILING—*The height above the ground or water of the base of the lowest layer of cloud below 6,000 meters (20,000 feet) covering more than half the sky.

CELESTIAL NAVIGATION— The determination of geographical position by reference to celestial bodies. Normally used in aviation as a secondary means of position determination.

CENTER— (See Air Route Traffic Control Center)

CENTER'S AREA— The specified airspace within which an air route traffic control center (ARTCC) provides air traffic control and advisory service. (See Air Route Traffic Control Center) (Refer to AIM)

CENTER WEATHER ADVISORY/CWA— An unscheduled weather advisory issued by Center Weather Service Unit meteorologists for ATC use to alert pilots of existing or anticipated adverse weather conditions within the next 2 hours. A CWA may modify or redefine a SIGMET.

CHAFF— Thin, narrow metallic reflectors of various lengths and frequency responses, used to reflect radar energy. These reflectors when dropped from aircraft and allowed to drift downward result in large targets on the radar display.

CHARTED VISUAL FLIGHT PROCEDURE (CVFP) APPROACH— An approach wherein a radar-controlled aircraft on an IFR flight plan, operating in VFR conditions and having an ATC authorization, may proceed to the airport of intended landing via visual landmarks and altitudes depicted on a charted visual flight procedure.

CHASE/CHASE AIRCRAFT— An aircraft flown in proximity to another aircraft normally to observe its performance during training or testing.

CIRCLE-TO-LAND MANEUVER/CIRCLING MANEUVER— A maneuver initiated by the pilot to align the aircraft with a runway for landing when a straight-in landing from an instrument approach is not possible or is not desirable. This maneuver is made only after ATC authorization has been obtained and the pilot has established required visual reference to the airport (See Circle to Runway, Landing Minimums) (Refer to AIM)

CIRCLE TO RUNWAY (RUNWAY NUMBERED)— Used by ATC to inform the pilot that he must circle to land because the runway in use is other than the runway aligned with the instrument approach procedure. When the direction of the circling maneuver in relation to the airport/runway is required, the controller will state the direction (eight cardinal compass points) and specify a left or right downwind or base leg as appropriate; e.g., "Cleared VOR Runway Three Six Approach circle to Runway Two Two," or "Circle northwest of the airport for a right downwind to Runway Two Two." (See Circle-to-Land Maneuver, Landing Minimums) (Refer to AIM)

CIRCLING APPROACH— (See Circle-to-Land Maneuver)

CIRCLING MINIMA— (See Landing Minimums)

CLEAR-AIR TURBULENCE/CAT— Turbulence encountered in air where no clouds are present. This term is commonly applied to high-level turbulence associated with wind shear. CAT is often encountered in the vicinity of the jet stream. (See Wind Shear, Jet Stream)

CLEARANCE— (See Air Traffic Clearance)

CLEARANCE LIMIT— The fix, point, or location to which an aircraft is cleared when issued an air traffic clearance.

*ICAO—CLEARANCE LIMIT—*The point of which an aircraft is granted an air traffic control clearance.

CLEARANCE VOID IF NOT OFF BY (TIME)— Used by ATC to advise an aircraft that the departure clearance is automatically cancelled if takeoff is not made prior to a specified time. The pilot must obtain a new clearance or cancel his IFR flight plan if not off by the specified time.

ICAO—CLEARANCE VOID TIME— A time specified by an air traffic control unit at which a clearance ceases to be valid unless the aircraft concerned has already taken action to comply therewith.

CLEARED AS FILED— Means the aircraft is cleared to proceed in accordance with the route of flight filed in the flight plan. This clearance does not include the altitude, SID, or SID Transition. (See Request Full Route Clearance) (Refer to AIM)

CLEARED FOR (Type Of) APPROACH— ATC authorization for an aircraft to execute a specific instrument approach procedure to an airport; e.g., "Cleared for ILS Runway Three Six Approach." (See Instrument Approach Procedure, Approach Clearance) (Refer to AIM, FAR Part 91)

CLEARED FOR APPROACH— ATC authorization for an aircraft to execute any standard or special instrument approach procedure for that airport. Normally, an aircraft will be cleared for a specific instrument approach procedure. (See Instrument Approach Procedure, Cleared for (Type of) Approach) (Refer to AIM, FAR Part 91)

CLEARED FOR TAKEOFF— ATC authorization for an aircraft to depart. It is predicated on known traffic and known physical airport conditions.

CLEARED FOR THE OPTION— ATC authorization for an aircraft to make a touch-and-go, low approach, missed approach, stop and go, or full stop landing at the discretion of the pilot. It is normally used in training so that an instructor can evaluate a student's performance under changing situations. (See Option Approach) (Refer to AIM)

CLEARED THROUGH— ATC authorization for an aircraft to make intermediate stops at specified airports without refiling a flight plan while en route to the clearance limit.

CLEARED TO LAND— ATC authorization for an aircraft to land. It is predicated on known traffic and known physical airport conditions.

CLEARWAY— An area beyond the takeoff runway under the control of airport authorities within which terrain or fixed obstacles may not extend above specified limits. These areas may be required for certain turbine-powered operations and the size and upward slope of the clearway will differ depending on when the aircraft was certificated. (Refer to FAR Part 1)

CLIMBOUT— That portion of flight operation between takeoff and the initial cruising altitude.

CLIMB TO VFR— ATC authorization for an aircraft to climb to VFR conditions within a control zone when the only weather limitation is restricted visibility. The aircraft must remain clear of clouds while climbing to VFR. (See Special VFR) (Refer to AIM)

CLOSED RUNWAY— A runway that is unusable for aircraft operations. Only the airport management/military operations office can close a runway.

CLOSED TRAFFIC— Successive operations involving takeoffs and landings or low approaches where the aircraft does not exit the traffic pattern.

CLUTTER— In radar operations, clutter refers to the reception and visual display of radar returns caused by precipitation, chaff, terrain, numerous aircraft targets, or other phenomena. Such returns may limit or preclude ATC from providing services based on radar. (See Ground Clutter, Chaff, Precipitation, Target)

ICAO—Radar Clutter—The visual indication on a radar display of unwanted signals.

COASTAL FIX— A navigation aid or intersection where an aircraft transitions between the domestic route structure and the oceanic route structure.

CODES/TRANSPONDER CODES— The number assigned to a particular multiple pulse reply signal transmitted by a transponder. (See Discrete Code)

COMBINED CENTER-RAPCON/CERAP— An air traffic facility which combines the functions of an ARTCC and a radar approach control facility. (See Air Route Traffic Control Center/ARTCC, Radar Approach Control Facility)

COMMON ROUTE/COMMON PORTION— That segment of a North American Route between the inland navigation facility and the coastal fix.

COMMON TRAFFIC ADVISORY FREQUENCY/CTAF— A frequency designed for the purpose of carrying out airport advisory practices while operating to or from an uncontrolled airport. The CTAF may be a UNICOM, Multicom, FSS, or tower frequency and is identified in appropriate aeronautical publications. (Refer to AC—90-42C)

COMPASS LOCATOR— A low power, low or medium frequency (L/MF) radio beacon installed at the site of the outer or middle marker of an instrument landing system (ILS). It can be used for navigation at distances of approximately 15 miles or as authorized in the approach procedure.

1. Outer Compass Locator/LOM—A compass locator installed at the site of the outer marker of an instrument landing system. (See Outer Marker)
2. Middle Compass Locator/LMM—A compass locator installed at the site of the middle marker of an instrument landing system. (See Middle Marker)

ICAO—LOCATOR—An LM/MF NDB used as an aid to final approach.

COMPASS ROSE— A circle, graduated in degrees, printed on some charts or marked on the ground at an airport. It is used as a reference to either true or magnetic direction.

COMPOSITE FLIGHT PLAN— A flight plan which specifies VFR operation for one portion of flight and IFR for another portion. It is used primarily in military operations. (Refer to AIM)

COMPOSITE ROUTE SYSTEM— An organized oceanic route structure, incorporating reduced lateral spacing between routes, in which composite separation is authorized.

COMPOSITE SEPARATION— A method of separating aircraft in a composite route system where, by management of route and altitude assignments, a combination of half the lateral minimum specified for the area concerned and half the vertical minimum is applied.

COMPULSORY REPORTING POINTS— Reporting points which must be reported to ATC. They are designated on aeronautical charts by solid triangles or filed in a flight plan as fixes selected to define direct routes. These points are geographical locations which are defined by navigation aids/fixes. Pilots should discontinue position reporting over compulsory reporting points when informed by ATC that their aircraft is in "radar contact."

CONFLICT ALERT— A function of certain air traffic control automated systems designed to alert radar controllers to existing or pending situations recognized by the program parameters that require his immediate attention/action.

CONSOLAN— A low frequency, long-distance NAVAID used principally for transoceanic navigations.

CONTACT—

1. Establish communication with (followed by the name of the facility and, if appropriate, the frequency to be used).
2. A flight condition wherein the pilot ascertains the attitude of his aircraft and navigates by visual reference to the surface. (See Contact Approach, Radar Contact)

CONTACT APPROACH— An approach wherein an aircraft on an IFR flight plan, having an air traffic control authorization, operating clear of clouds with at least 1 mile flight visibility and a reasonable expectation of continuing to the destination airport in those conditions, may deviate from the instrument approach procedure and proceed to the destination airport by visual reference to the surface. This approach will only be authorized when requested by the pilot and the **reported ground visibility** at the destination airport is at least 1 statute mile. (Refer to AIM)

CONTERMINOUS U.S.— The forty-eight adjoining states and the District of Columbia.

CONTINENTAL CONTROL AREA— (See Controlled Airspace)

CONTINENTAL UNITED STATES— The 49 states located on the continent of North America and the District of Columbia.

CONTROL AREA— (See Controlled Airspace)

CONTROLLED AIRSPACE— Airspace designated as a continental control area, control area, control zone, terminal control area, transition area, or positive control area within which some or all aircraft may be subject to air traffic control. (Refer to AIM, FAR Part 71)

ICAO—CONTROLLED AIRSPACE—Airspace of defined dimensions within which air traffic control service is provided to controlled flights.

Types of U.S. Controlled Airspace:

1. Continental Control Area—The airspace of the 48 contiguous states, the District of Columbia and Alaska, excluding the Alaska peninsula west of Long. 160° 00' 00"W, at and above 14,500 feet MSL, but does not include:
   a. The airspace less than 1,500 feet above the surface of the earth or,
   b. Prohibited and restricted areas, other than the restricted areas listed in FAR Part 71.
2. Control Area—Airspace designated as Colored Federal Airways, VOR Federal Airways, control areas associated with jet routes outside the continental control area (FAR 71.161), additional control areas (FAR 71.163), control area extensions (FAR 71.165), and area low routes. Control areas do not include the continental control area, but unless otherwise designated, they do include the airspace between a segment of a main VOR Federal Airway and its associated alternate segments with the vertical extent of the area corresponding to the vertical extent of the related segment of the main airway. The vertical extent of the various categories of airspace contained in control areas is defined in FAR Part 71.

ICAO—Control Area—A controlled airspace extending upward from a specified limit above the earth.

3. Control Zone—Controlled airspace which extends upward from the surface and terminates at the base of the continental control area. Control zones that do not underlie the continental control area have no upper limit. A control zone may include one or more airports and is normally a circular area within a radius of 5 statute miles and any extensions necessary to include instrument approach and departure paths.

ICAO—Control Zone—A controlled airspace extending upwards from the surface of the earth to a specified upper limit.

4. Terminal Control Area/TCA—Controlled airspace extending upward from the surface or higher to specified altitudes, within which all aircraft are subject to operating rules and pilot and equipment requirements specified in FAR Part 91. TCA's are depicted on Sectional, World Aeronautical, En Route Low Altitude, DOD FLIP and TCA charts. (Refer to FAR Part 91, AIM)

ICAO—Terminal Control Area—A control area normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes.

5. Transition Area—Controlled airspace extending upward from 700 feet or more above the surface of the earth when designated in conjunction with an airport for which an approved instrument approach procedure has been prescribed, or from 1,200 feet or more above the surface of the earth when designated in conjunction with airway route structures or segments. Unless otherwise limited, transition areas terminate at the base of the overlying controlled airspace. Transition areas are designed to contain IFR operations in controlled airspace during portions of the terminal operation and while transiting between the terminal and en route environment.
6. Positive Control Area/PCA—Airspace designated in FAR Part 71 within which there is positive control of aircraft. Flight in PCA is normally conducted under instrument flight rules. PCA is designated throughout most of the conterminous United States and its vertical extent is from 18,000 feet MSL to and including flight level 600. In Alaska PCA does not include the airspace less than 1,500 feet above the surface of the earth, nor the airspace over the Alaska Peninsula west of longitude 160 degrees West. Rules for operating in PCA are found in FARs 91.97 and 91.24.

CONTROLLER— (See Air Traffic Control Specialist)

CONTROL SECTOR— An airspace area of defined horizontal and vertical dimensions for which a controller, or group of controllers, has air traffic control responsibility, normally within an air route traffic control center or an approach control facility. Sectors are established based on predominant traffic flows, altitude strata, and controller workload. Pilot-communications during operations within a sector are normally maintained on discrete frequencies assigned to the sector. (See Discrete Frequency)

CONTROL SLASH— A radar beacon slash representing the actual position of the associated aircraft. Normally, the control slash is the one closest to the interrogating radar beacon site. When ARTCC radar is operating in narrowband (digitized) mode, the control slash is converted to a target symbol.

CONTROL ZONE— (See Controlled Airspace)

***CONVECTIVE SIGMET* /WST/CONVECTIVE SIGNIFICANT METEOROLOGICAL INFORMATION—** A weather advisory concerning convective weather significant to the safety of all aircraft. Convective SIGMET's are issued for tornadoes, lines of thunderstorms, embedded thunderstorms of any intensity level, areas of thunderstorms greater than or equal to VIP level 4 with an areal coverage of 4/10 (40%) or more, and hail 3/4 inch or greater. (See SIGMET, AIRMET) (Refer to AIM)

COORDINATES— The intersection of lines of reference, usually expressed in degrees/minutes/seconds of latitude and longitude, used to determine position or location.

COORDINATION FIX— The fix in relation to which facilities will handoff, transfer control of an aircraft, or coordinate flight progress data. For terminal facilities, it may also serve as a clearance for arriving aircraft.

CORRECTION— An error has been made in the transmission and the correct version follows.

COURSE—

1. The intended direction of flight in the horizontal plane measured in degrees from north.
2. The ILS localizer signal pattern usually specified as front course or back course.

   (See Bearing, Radial, Instrument Landing Systems)

CRITICAL ENGINE— The engine which, upon failure, would most adversely affect the performance or handling qualities of an aircraft.

CROSS (FIX) AT (ALTITUDE)— Used by ATC when a specific altitude restriction at a specified fix is required.

CROSS (FIX) AT OR ABOVE (ALTITUDE)— Used by ATC when an altitude restriction at a specified fix is required. It does not prohibit the aircraft from crossing the fix at a higher altitude than specified; however, the higher altitude may not be one that will violate a succeeding altitude restriction or altitude assignment. (See Altitude Assignment, Altitude Restriction.) (Refer to AIM)

CROSS (FIX) AT OR BELOW (ALTITUDE)— Used by ATC when a maximum crossing altitude at a specific fix is required. It does not prohibit the aircraft from crossing the fix at a lower altitude; however, it must be at or above the minimum IFR altitude. (See Minimum IFR Altitude, Altitude Restriction) (Refer to FAR Part 91)

CROSSWIND—

1. When used concerning the traffic pattern, the word means "crosswind leg." (See Traffic Pattern)
2. When used concerning wind conditions, the word means a wind not parallel to the runway or the path of an aircraft. (See Crosswind Component)

CROSSWIND COMPONENT— The wind component measured in knots at 90 degrees to the longitudinal axis of the runway.

CRUISE— Used in an ATC clearance to authorize a pilot to conduct flight at any altitude from the minimum IFR altitude up to and including the altitude specified in the clearance. The pilot may level off at any intermediate altitude within this block of airspace. Climb/descent within the block is to be made at the discretion of the pilot. However, once the pilot starts descent and verbally reports leaving an altitude in the block he may not return to that altitude without additional ATC clearance. Further, it is approval for the pilot to proceed to and make an approach at destination airport and can be used in conjunction with:

1. An airport clearance limit at locations with a standard/special instrument approach procedure. The FARs require that if an instrument letdown to an airport is necessary the pilot shall make the letdown in accordance with a standard/special instrument approach procedure for that airport, or
2. An airport clearance limit at locations that are within/below/outside controlled airspace and without a standard/special instrument approach procedure. Such a clearance is NOT AUTHORIZATION for the pilot to descend under IFR conditions below the applicable minimum IFR altitude nor does it imply that ATC is exercising control over aircraft in uncontrolled airspace; however, it provides a means for the aircraft to proceed to destination airport, descend and land in accordance with applicable FARs governing VFR flight operations. Also, this provides search and rescue protection until such time as the IFR flight plan is closed. (See Instrument Approach Procedure)

CRUISING ALTITUDE/LEVEL— An altitude or flight level maintained during en route level flight. This is a constant altitude and should not be confused with a cruise clearance. (See Altitude)

*ICAO—CRUISING LEVEL—*A level maintained during a significant portion of a flight.

DECISION HEIGHT/DH— With respect to the operation of aircraft, means the height at which a decision must be made during an ILS or PAR instrument approach to either continue the approach or to execute a missed approach.

*ICAO—DECISION HEIGHT—*A specified height at which a missed approach must be initiated if the required visual reference to continue the approach to land has not been established.

DECODER— The device used to decipher signals received from ATCRBS transponders to effect their display as select codes. (See Codes, Radar)

DEFENSE VISUAL FLIGHT RULES/DVFR— Rules applicable to flights within an ADIZ conducted under the visual flight rules in FAR Part 91. (See Air Defense Identification Zone) (Refer to FAR Part 99)

DELAY INDEFINITE (REASON IF KNOWN) EXPECT FURTHER CLEARANCE (TIME)— Used by ATC to inform a pilot when an accurate estimate of the delay time and the reason for the delay cannot immediately be determined; e.g., a disabled aircraft on the runway, terminal or center area saturation, weather below landing minimums, etc. (See Expect Further Clearance)

DEPARTURE CONTROL— A function of an approach control facility providing air traffic control service for departing IFR and, under certain conditions, VFR aircraft. (See Approach Control) (Refer to AIM)

DEPARTURE TIME— The time an aircraft becomes airborne.

DEVIATIONS—

1. A departure from a current clearance, such as an off course maneuver to avoid weather or turbulence.
2. Where specifically authorized in the FAR's and requested by the pilot, ATC may permit pilots to deviate from certain regulations. (Refer to AIM)

DF APPROACH PROCEDURE— Used under emergency conditions where another instrument approach procedure cannot be executed. DF guidance for an instrument approach is given by ATC facilities with DF capability. (See DF Guidance, Direction Finder) (Refer to AIM)

DF FIX— The geographical location of an aircraft obtained by one or more direction finders. (See Direction Finder)

DF GUIDANCE/DF STEER— Headings provided to aircraft by facilities equipped with direction finding equipment. These headings, if followed, will lead the aircraft to a predetermined point such as the DF station or an airport. DF guidance is given to aircraft in distress or to other aircraft which request the service. Practice DF guidance is provided when workload permits. (See Direction Finder, DF Fix) (Refer to AIM)

DIRECT— Straight line flight between two navigational aids, fixes, points or any combination thereof. When used by pilots in describing off-airway routes, points defining direct route segments become compulsory reporting points unless the aircraft is under radar contact.

DIRECTION ALTITUDE AND IDENTITY READOUT/DAIR— The DAIR System is a modification to the AN/TPX-42 Interrogator System. The Navy has two adaptations of the DAIR System, Carrier Air Traffic Control Direct Altitude and Identification Readout System for Aircraft Carriers and Radar Air Traffic Control Facility Direct Altitude and Identity Readout System for land based terminal operations. The DAIR detects, tracks, and predicts secondary radar aircraft targets. Targets are displayed by means of computer generated symbols and alphanumeric characters depicting flight identification, altitude, ground speed, and flight plan data. The DAIR System is capable of interfacing with ARTCC's.

DIRECTION FINDER/DF/UDF/VDF/UVDF— A radio receiver equipped with a directional sensing antenna used to take bearings on a radio transmitter. Specialized radio direction finders are used in aircraft as air navigation aids. Others are ground based primarily to obtain a "fix" on a pilot requesting orientation assistance, or to locate downed aircraft. A location "fix" is established by the intersection of two or more bearing lines plotted on a navigational chart using either two separately located Direction Finders to obtain a fix on an aircraft or by a pilot plotting the bearing indications of his DF on two separately located ground based transmitters both of which can be identified on his chart. UDFs receive signals in the ultra high frequency radio broadcast band; VDF's in the very high frequency band; and UVDFs in both bands. ATC provides DF service at those air traffic control towers and flight service stations listed in the Airport/Facility Directory, and DOD FLIP IFR En Route Supplement. (See DF Guidance, DF Fix).

DISCRETE CODE/DISCRETE BEACON CODE— As used in the Air Traffic Control Radar Beacon System (ATCRBS), any one of the 4096 selectable Mode 3/A aircraft transponder codes except those ending in zero zero; e.g., discrete codes: 0010, 1201, 2317, 7777; non-discrete codes: 0100, 1200, 7700. Non-discrete codes are normally reserved for radar facilities that are not equipped with discrete decoding capability and for other purposes such as emergencies (7700), VFR aircraft (1200), etc. (See Radar) (Refer to AIM)

DISCRETE FREQUENCY— A separate radio frequency for use in direct pilot-controller communications in air traffic control which reduces frequency congestion by controlling the number of aircraft operating on a particular frequency at one time. Discrete frequencies are normally designated for each control sector in en route/terminal ATC facilities. Discrete frequencies are listed in the Airport/Facility Directory, and DOD FLIP IFR En Route Supplement. (See Control Sector)

DISPLACED THRESHOLD— A threshold that is located at a point on the runway other than the designated beginning of the runway. (See Threshold) (Refer to AIM)

DISTANCE MEASURING EQUIPMENT/DME— Equipment(airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid. (See TACAN, VORTAC)

DISTRESS— A condition of being threatened by serious and/or imminent, danger, and of requiring immediate assistance.

DME FIX— A geographical position determined by reference to a navigational aid which provides distance and azimuth information. It is defined by a specific distance in nautical miles and a radial or course (i.e., localizer) in degrees magnetic from that aid. (See Distance Measuring Equipment/DME, Fix)

DME SEPARATION— Spacing of aircraft in terms of distances (nautical miles) determined by reference to distance measuring equipment (DME) (See Distance Measuring Equipment).

DOD FLIP— Department of Defense Flight Information Publications used for flight planning, en route, and terminal operations. FLIP is produced by the Defense Mapping Agency for world-wide use. United States Government Flight Information Publications (en route charts and instrument approach procedure charts) are incorporated in DOD FLIP for use in the National Airspace System (NAS).

DOWNWIND LEG— (See Traffic Pattern)

DRAG CHUTE— A parachute device installed on certain aircraft which is deployed on landing roll to assist in deceleration of the aircraft.

EMERGENCY— A DISTRESS or URGENCY condition.

EMERGENCY LOCATOR TRANSMITTER/ELT— A radio transmitter attached to the aircraft structure which operates from its own power source on 121.5 MHz and 243.0 MHz. It aids in locating downed aircraft by radiating a downward sweeping audio tone, 2-4 times per second. It is designed to function without human action after an accident. (Refer to FAR Part 91, AIM)

EMERGENCY SAFE ALTITUDE— (See Minimum Safe Altitude)

E-MSAW— (See En Route Minimum Safe Altitude Warning)

EN ROUTE AIR TRAFFIC CONTROL SERVICES— Air traffic control service provided aircraft on IFR flight plans generally by centers, when these aircraft are operating between departure and destination terminal areas. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft. (See NAS Stage A, Air Route Traffic Control Center) (Refer to AIM)

EN ROUTE AUTOMATED RADAR TRACKING SYSTEM/EARTS— An automated radar and radar beacon tracking system. Its functional capabilities and design are essentially the same as the terminal ARTS IIIA system except for the EARTS capability of employing both short-range (ASR) and long-range (ARSR) radars, use of full digital radar displays, and fail-safe design. (See Automated Radar Terminal Systems/ARTS)

EN ROUTE CHARTS— (See Aeronautical Charts)

EN ROUTE DESCENT— Descent from the en route cruising altitude which takes place along the route of flight.

EN ROUTE FLIGHT ADVISORY SERVICE/FLIGHT WATCH— A service specifically designed to provide, upon pilot request, timely weather information pertinent to his type of flight, intended route of flight and altitude. The FSSs providing this service are listed in The Airport/Facility Directory. (Refer to AIM)

EN ROUTE MINIMUM SAFE ALTITUDE WARNING/E-MSAW— A function of the NAS Stage A en route computer that aids the controller by alerting him when a tracked aircraft is below or predicted by the computer to go below a predetermined minimum IFR altitude (MIA).

EXECUTE MISSED APPROACH— Instructions issued to a pilot making an instrument approach which means continue inbound to the missed approach point and execute the missed approach procedure as described on the Instrument Approach Procedure Chart, or as previously assigned by ATC. The pilot may climb immediately to the altitude specified in the missed approach procedure upon making a missed approach. No turns should be initiated prior to reaching the missed approach point. When conducting an ASR or PAR approach, execute the assigned missed approach procedure immediately upon receiving instructions to "execute missed approach." (Refer to AIM)

EXPECT (ALTITUDE) AT (TIME) or (FIX)— Used under certain conditions in a departure clearance to provide a pilot with an altitude to be used in the event of two-way communication failure. (Refer to AIM)

EXPECT DEPARTURE CLEARANCE (TIME)/EDCT— Used in Fuel Advisory Departure (FAD) program. The time the operator can expect a gate release. Excluding long distance flights, an EDCT will always be assigned even though it may be the same as the Estimated Time of Departure (ETD). The EDCT is calculated by adding the ground delay factor. (See Fuel Advisory Departure)

EXPECT FURTHER CLEARANCE (TIME)/EFC— The time a pilot can expect to receive clearance beyond a clearance limit.

EXPECT FURTHER CLEARANCE VIA (AIRWAYS, ROUTES OR FIXES)— Used to inform a pilot of the routing he can expect if any part of the route beyond a short range clearance limit differs from that filed.

EXPEDITE— Used by ATC when prompt compliance is required to avoid the development of an imminent situation.

FAST FILE— A system whereby a pilot files a flight plan via telephone that is tape recorded and then transcribed for transmission to the appropriate air traffic facility. Locations having a fast file capability are contained in the Airport/Facility Directory. Refer to AIM)

FEATHERED PROPELLER— A propeller whose blades have been rotated so that the leading and trailing edges are nearly parallel with the aircraft flight path to stop or minimize drag and engine rotation. Normally used to indicate shutdown of a reciprocating or turboprop engine due to malfunction.

FEEDER ROUTE— A route depicted on instrument approach procedure charts to designate routes for aircraft to proceed from the en route structure to the initial approach fix (IAF). (See Instrument Approach Procedure)

FERRY FLIGHT— A flight for the purpose of:

1. Returning an aircraft to base,
2. Delivering an aircraft from one location to another.
3. Moving an aircraft to and from a maintenance base.

Ferry flights, under certain conditions may be conducted under terms of a special flight permit.

FILED— Normally used in conjunction with flight plans, meaning a flight plan has been submitted to ATC.

FILED EN ROUTE DELAY— Any of the following preplanned delays at points/areas along the route of flight which require special flight plan filing and handling techniques.

1. Terminal Area Delay—A delay within a terminal area for touch-and-go, low approach, or other terminal area activity.
2. Special Use Airspace Delay—A delay within a Military Operating Area, Restricted Area, Warning Area, or ATC Assigned Airspace.
3. Aerial Refueling Delay—A delay within an Aerial Refueling Track or Anchor.

FINAL— Commonly used to mean that an aircraft is on the final approach course or is aligned with a landing area. (See Final Approach Course, Final Approach—IFR, Traffic Pattern, Segments of an Instrument Approach Procedure)

FINAL APPROACH COURSE— A straight line extension of a localizer, a final approach radial/bearing, or a runway centerline, all without regard to distance. (See Final Approach— IFR, Traffic Pattern)

FINAL APPROACH FIX/FAF— The designated fix from or over which the final approach (IFR) to an airport is executed. The FAF identifies the beginning of the final approach segment of the instrument approach. (See Final Approach Point, Segments of an Instrument Approach Procedure, Glide Slope Intercept Altitude)

FINAL APPROACH—IFR— The flight path of an aircraft which is inbound to an airport on a final instrument approach course, beginning at the final approach fix or point and extending to the airport or the point where a circle to land maneuver or a missed approach is executed. (See Segments of an Instrument Approach Procedure, Final Approach Fix, Final Approach Course, Final Approach Point)

ICAO—FINAL APPROACH— That part of an instrument approach procedure from the time the aircraft has:

1. Completed the last procedure turn or base turn, where one is specified, or
2. Crossed a specified fix, or
3. Intercepted the last track specified for the procedures until it has crossed a point in the vicinity of an aerodrome from which:
   a. A landing can be made, or
   b. A missed approach procedure is initiated.

FINAL APPROACH POINT— The point, within prescribed limits of an instrument approach procedure, where the aircraft is established on the final approach course and final approach descent may be commenced. A final approach point is applicable only in nonprecision approaches where a final approach fix has not been established. In such instances, the point identifies the beginning of the final approach segment of the instrument approach. (See Final Approach Fix, Segments of an Instrument Approach Procedure, Glide Slope Intercept Altitude)

FINAL APPROACH SEGMENT— (See Segments of an Instrument Approach Procedure)

FINAL APPROACH—VFR— (See Traffic Pattern)

FINAL CONTROLLER— The controller providing information and final approach guidance during PAR and ASR approaches utilizing radar equipment. (See Radar Approach)

FIX— A geographical position determined by visual reference to the surface, by reference to one or more radio NAVAIDs, by celestial plotting, or by another navigational device.

FLAG/FLAG ALARM— A warning device incorporated in certain airborne navigation and flight instruments indicating that:

1. Instruments are inoperative or otherwise not operating satisfactorily, or
2. Signal strength or quality of the received signal falls below acceptable values.

FLAMEOUT— Unintended loss of combustion in turbine engines resulting in the loss of engine power.

FLIGHT CHECK— A call-sign prefix used by FAA aircraft engaged in flight inspection/certification of navigational aids and flight procedures. The word "recorded" may be added as a suffix; e.g., "Flight Check 320 recorded" to indicate that an automated flight inspection is in progress in terminal areas. (See Flight Inspection/Flight Check) (Refer to AIM).

FLIGHT INFORMATION REGION/FIR— An airspace of defined dimensions within which Flight Information Service and Alerting Service are provided.

1. Flight Information Service—A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.
2. Alerting Service—A service provided to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

FLIGHT INSPECTION/FLIGHT CHECK— Inflight investigation and evaluation of a navigational aid to determine whether it meets established tolerances. (See Navigational Aid)

FLIGHT LEVEL— A level of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury. Each is stated in three digits that represent hundreds of feet. For example, flight level 250 represents a barometric altimeter indication of 25,000 feet; flight level 255, an indication of 25,500 feet.

ICAO—FLIGHT LEVELS—Surfaces of constant atmospheric pressure which are related to a specific pressure datum, 1013.2 mb (29.92 inches) and are separated by specific pressure intervals.

FLIGHT LINE— A term used to describe the precise movement of a civil photogrammetric aircraft along a predetermined course(s), at a predetermined altitude, during the actual photographic run.

FLIGHT PATH— A line, course, or track along which an aircraft is flying or intended to be flown. (See Track, Course)

FLIGHT PLAN— Specified information relating to the intended flight of an aircraft that is filed orally or in writing with an FSS or an ATC facility. (See Fast File, Filed) (Refer to AIM)

FLIGHT RECORDER— A general term applied to any instrument or device that records information about the performance of an aircraft in flight or about conditions encountered in flight. Flight recorders may make records of airspeed, outside air temperature, vertical acceleration, engine RPM, manifold pressure, and other pertinent variables for a given flight.

ICAO—FLIGHT RECORDER—Any type of recorder installed in the aircraft for the purpose of complementing accident/incident investigation.

FLIGHT SERVICE STATION/FSS— Air traffic facilities which provide pilot briefing, en route communications and VFR search and rescue services, assist lost aircraft and aircraft in emergency situations, relay ATC clearances, originate Notices to Airmen, broadcast aviation weather and NAS information, receive and process IFR flight plans and monitor NAVAIDS. In addition, at selected locations FSSs provide Enroute Flight Advisory Service (Flight Watch), take weather observations, issue airport advisories, and advise Customs and Immigration of transborder flights. (Refer to AIM)

FLIGHT STANDARDS DISTRICT OFFICE/FSDO— An FAA field office serving an assigned geographical area, staffed with Flight Standards personnel who serve the aviation industry and the general public on matters relating to the certification and operation of air carrier and general aviation aircraft. Activities include general surveillance of operational safety, certification of airmen and aircraft, accident prevention, investigation, enforcement, etc.

FLIGHT TEST— A flight for the purpose of:

1. Investigating the operation/flight characteristics of an aircraft or aircraft component.
2. Evaluating an applicant for a pilot certificate or rating.

FLIGHT VISIBILITY— (See Visibility)

FLIGHT WATCH— A shortened term for use in air-ground contacts on frequency 122.0 MHz to identify the flight service station providing En Route Flight Advisory Service; e.g., "Oakland Flight Watch." (See En Route Flight Advisory Service)

FLIP— (See DOD FLIP)

FLOW CONTROL— Measures designed to adjust the flow of traffic into a given airspace, along a given route, or bound for a given aerodrome (airport) so as to ensure the most effective utilization of the airspace. (See Quota Flow Control) (Refer to Airport/Facility Directory

FLY HEADING (DEGREES)— Informs the pilot of the heading he should fly. The pilot may have to turn to, or continue on, a specific compass direction in order to comply with the instructions. The pilot is expected to turn in the shorter direction to the heading, unless otherwise instructed by ATC.

FORMATION FLIGHT— More than one aircraft which, by prior arrangement between the pilots, operate as a single aircraft with regard to navigation and position reporting. Separation between aircraft within the formation is the responsibility of the flight leader and the pilots of the other aircraft in the flight. This includes transition periods when aircraft within the formation are maneuvering to attain separation from each other to effect individual control and during join-up and breakaway.

1. A standard formation is one in which a proximity of no more than 1 mile laterally or longitudinally and within 100 feet vertically from the flight leader is maintained by each wingman.
2. Nonstandard formations are those operating under any of the following conditions:
   a. When the flight leader has requested and ATC has approved other than standard formation dimensions.
   b. When operating within an authorized altitude reservation (ALTRV) or under the provisions of a letter of agreement.
   c. When the operations are conducted in airspace specifically designed for a special activity. (See Altitude Reservation) (Refer to FAR Part 91)

FSS— (See Flight Service Station)

FUEL ADVISORY DEPARTURE/FAD— Procedures to minimize engine running time for aircraft destined for an airport experiencing prolonged arrival delays. (Refer to AIM)

FUEL DUMPING— Airborne release of usable fuel. This does not include the dropping of fuel tanks. (See Jettisoning of External Stores)

FUEL SIPHONING/FUEL VENTING— Unintentional release of fuel caused by overflow, puncture, loose cap, etc.

GATE HOLD PROCEDURES— Procedures at selected airports to hold aircraft at the gate or other ground location whenever departure delays exceed or are anticipated to exceed 5 minutes. The sequence for departure will be maintained in accordance with initial call up unless modified by Flow Control restrictions. Pilots should monitor the ground control/clearance delivery frequency for engine startup advisories or new proposed start time if the delay changes. (See Flow Control)

GENERAL AVIATION— That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of public convenience and necessity from the Civil Aeronautics Board and large aircraft commercial operators.

*ICAO—GENERAL AVIATION—*All civil aviation operations other than scheduled air services and nonscheduled air transport operations for remuneration or hire.

GENERAL AVIATION DISTRICT OFFICE/GADO— An FAA field office serving a designated geographical area, staffed with Flight Standards personnel, who have responsibility for serving the aviation industry and the general public on all matters relating to the certification and operation of general aviation aircraft.

GLIDE PATH, (ON/ABOVE/BELOW)— Used by ATC to inform an aircraft making a PAR approach of its vertical position (elevation) relative to the descent profile. The terms "slightly" and "well" are used to describe the degree of deviation; e.g., "slightly above glidepath." Trend information is also issued with respect to the elevation of the aircraft and may be modified by the terms "rapidly" and "slowly;" e.g., "well above glidepath, coming down rapidly." (See PAR Approach)

GLIDE SLOPE/GS— Provides vertical guidance for aircraft during approach and landing. The glide slope consists of the following:

1. Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS, or
2. Visual ground aids, such as VASI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

ICAO—GLIDE PATH— A descent profile determined for vertical guidance during a final approach.

GLIDE SLOPE INTERCEPT ALTITUDE— The minimum altitude of the intermediate approach segment prescribed for a precision approach which assures required obstacle clearance. It is depicted on instrument approach procedure charts. (See Segments of an Instrument Approach Procedure, Instrument Landing System)

GO AHEAD— Proceed with your message. Not to be used for any other purpose.

GO AROUND— Instructions for a pilot to abandon his approach to landing. Additional instructions may follow. Unless otherwise advised by ATC, a VFR aircraft or an aircraft conducting visual approach should overfly the runway while climbing to traffic pattern altitude and enter the traffic pattern via the crosswind leg. A pilot on an IFR flight plan making an instrument approach should execute the published missed approach procedure or proceed as instructed by ATC, e.g., "Go around" (additional instructions, if required). (See Low Approach, Missed Approach)

GROUND CLUTTER— A pattern produced on the radar scope by ground returns which may degrade other radar returns in the affected area. The effect of ground clutter is minimized by the use of moving target indicator (MTI) circuits in the radar equipment resulting in a radar presentation which displays only targets which are in motion. (See Clutter)

GROUND CONTROLLED APPROACH/GCA— A radar approach system operated from the ground by air traffic control personnel transmitting instructions to the pilot by radio. The approach may be conducted with surveillance radar (ASR) only or with both surveillance and precision approach radar (PAR). Usage of the term "GCA" by pilots is discouraged except when referring to a GCA facility. Pilots should specifically request a "PAR" approach when a precision radar approach is desired or request an "ASR" or "surveillance" approach when a nonprecision radar approach is desired. (See Radar Approach)

GROUND SPEED— The speed of an aircraft relative to the surface of the earth.

GROUND VISIBILITY— (See Visibility)

HANDOFF— An action taken to transfer the radar identification of an aircraft from one controller to another if the aircraft will enter the receiving controller's airspace and radio communications with the aircraft will be transferred.

HAVE NUMBERS— Used by pilots to inform ATC that they have received runway, wind, and altimeter information only.

HEAVY (AIRCRAFT)— (See Aircraft Classes)

HEIGHT ABOVE AIRPORT/HAA— The height of the Minimum Descent Altitude above the published airport elevation. This is published in conjunction with circling minimums. (See Minimum Descent Altitude)

HEIGHT ABOVE LANDING/HAL— The height above a designated helicopter landing area used for helicopter instrument approach procedures. (Refer to FAR Part 97)

HEIGHT ABOVE TOUCHDOWN/HAT— The height of the Decision Height or Minimum Descent Altitude above the highest runway elevation in the touchdown zone (first 3,000 feet of the runway). HAT is published on instrument approach charts in conjunction with all straight-in minimums. (See Decision Height, Minimum Descent Altitude)

HELICOPTER/COPTER— Rotorcraft that, for its horizontal motion, depends principally on its engine-driven rotors.

*ICAO—HELICOPTER—*A heavier-than-air aircraft supported in flight by the reactions of the air on one or more power-driven rotors on substantially vertical axes.

HELIPAD— A small, designated area, usually with a prepared surface, on a heliport, airport, landing/takeoff area, apron/ramp, or movement area used for takeoff, landing, or parking of helicopters.

HELIPORT— An area of land, water, or structure used or intended to be used for the landing and takeoff of helicopters and includes its buildings and facilities, if any.

HERTZ/Hz— The standard radio equivalent of frequency in cycles per second of an electromagnetic wave. Kilohertz (kHz) is a frequency of one thousand cycles per second. Megahertz (MHz) is a frequency of one million cycles per second.

HIGH FREQUENCY COMMUNICATIONS/HF COMMUNICATIONS— High radio frequencies (HF) between 3 and 30 MHz used for air-to-ground voice communication in overseas operations.

HIGH FREQUENCY/HF— The frequency band between 3 and 30 MHz. (See High Frequency Communications)

HIGH SPEED TAXIWAY/EXIT/TURNOFF— A long radius taxiway designed and provided with lighting or marking to define the path of aircraft, traveling at high speed (up to 60 knots), from the runway center to a point on the center of a taxiway. Also referred to as long radius exit or turn-off taxiway. The high speed taxiway is designed to expedite aircraft turning off the runway after landing, thus reducing runway occupancy time.

HOLD/HOLDING PROCEDURE— A predetermined maneuver which keeps aircraft within a specified airspace while awaiting further clearance from air traffic control. Also used during ground operations to keep aircraft within a specified area or at a specified point while awaiting further clearance from air traffic control. (See Holding Fix) (Refer to AIM)

HOLDING FIX— A specified fix identifiable to a pilot by NAVAIDS or visual reference to the ground used as a reference point in establishing and maintaining the position of an aircraft while holding. (See Fix, Hold, Visual Holding) (Refer to AIM)

ICAO—HOLDING POINT— A specified location, identified by visual or other means, in the vicinity of which the position of an aircraft in flight is maintained with air traffic control clearances.

HOMING— Flight toward a NAVAID, without correcting for wind, by adjusting the aircraft heading to maintain a relative bearing of zero degrees. (See Bearing)

*ICAO—HOMING—*The procedure of using the direction-finding equipment of one radio station with the emission of another radio station, where at least one of the stations is mobile, and whereby the mobile station proceeds continuously towards the other station.

HOVER CHECK— Used to describe when a helicopter/VTOL aircraft requires a stabilized hover to conduct a performance/power check prior to hover taxi, air taxi, or takeoff. Altitude of the hover will vary based on the purpose of the check.

HOVER TAXI— Used to describe a helicopter/VTOL aircraft movement conducted above the surface and in ground effect at airspeeds less than approximately 20 knots. The actual height may vary and some helicopters may require hover taxi above 25 feet AGL to reduce ground effect turbulence or provide clearance for cargo slingloads. (See Air Taxi, Hover Check) (Refer to AIM)

HOW DO YOU HEAR ME?— A question relating to the quality of the transmission or to determine how well the transmission is being received.

IDENT— A request for a pilot to activate the aircraft transponder identification feature. This will help the controller to confirm an aircraft identity or to identify an aircraft. (Refer to AIM)

IDENT FEATURE— The special feature in the Air Traffic Control Radar Beacon System (ATCRBS) equipment. It is used to immediately distinguish one displayed beacon target from other beacon targets. (See IDENT)

IF FEASIBLE, REDUCE SPEED TO (SPEED)— (See Speed Adjustment)

IF NO TRANSMISSION RECEIVED FOR (TIME)— Used by ATC in radar approaches to prefix procedures which should be followed by the pilot in event of lost communications. (See Lost Communications)

IFR AIRCRAFT/IFR FLIGHT— An aircraft conducting flight in accordance with instrument flight rules.

IFR CONDITIONS— Weather conditions below the minimum for flight under visual flight rules. (See Instrument Meteorological Conditions)

IFR DEPARTURE PROCEDURE— (See IFR Takeoff Minimums and Departure Procedures) (Refer to AIM)

IFR MILITARY TRAINING ROUTES (IR)— Routes used by the Department of Defense and associated Reserve and Air Guard units for the purpose of conducting low-altitude navigation and tactical training in both IFR and VFR weather conditions below 10,000 feet MSL at airspeeds in excess of 250 knots IAS.

IFR TAKEOFF MINIMUMS AND DEPARTURE PROCEDURES— FAR, Part 91, prescribes standard takeoff rules for certain civil users. At some airports, obstructions or other factors require the establishment of nonstandard takeoff minimums, departure procedures, or both, to assist pilots in avoiding obstacles during climb to the minimum en route altitude. Those airports are listed in NOS/DOD Instrument Approach Charts (IAPs) under a section entitled "IFR Takeoff Minimums and Departure Procedures." The NOS/DOD IAP chart legend illustrates the symbol used to alert the pilot to nonstandard takeoff minimums and departure procedures. When departing IFR from such airports, or from any airports where there are no departure procedures, SIDs, or ATC facilities available, pilots should advise ATC of any departure limitations. Controllers may query a pilot to determine acceptable departure directions, turns, or headings after takeoff. Pilots should be familiar with the departure procedures and must assure that their aircraft can meet or exceed any specified climb gradients.

ILS CATEGORIES—

1. ILS Category I—An ILS approach procedure which provides for approach to a height above touchdown of not less than 200 feet and with runway visual range of not less than 1,800 feet.

2. ILS Category II—An ILS approach procedure which provides for approach to a height above touchdown of not less than 100 feet and with runway visual range of not less than 1,200 feet.
3. ILS Category III.
   a. IIIA—An ILS approach procedure which provides for approach without a decision height minimum and with runway visual range of not less than 700 feet.
   b. IIIB—An ILS approach procedure which provides for approach without a decision height minimum and with runway visual range of not less than 150 feet.
   c. IIIC—An ILS approach procedure which provides for approach without a decision height minimum and without runway visual range minimum.

IMMEDIATELY— Used by ATC when such action compliance is required to avoid an imminent situation.

INCREASE SPEED TO (SPEED)— (See Speed Adjustment)

INFORMATION REQUEST/INREQ— A request originated by an FSS for information concerning an overdue VFR aircraft.

INITIAL APPROACH FIX/IAF— The fixes depicted on instrument approach procedure charts that identify the beginning of the initial approach segment(s). (See Fix, Segments of an Instrument Approach Procedure)

INITIAL APPROACH SEGMENT— (See Segments of an Instrument Approach Procedure)

INNER MARKER/IM/INNER MARKER BEACON— A marker beacon used with an ILS (CAT II) precision approach located between the middle marker and the end of the ILS runway, transmitting a radiation pattern keyed at six dots per second and indicating to the pilot, both aurally and visually, that he is at the designated decision height (DH), normally 100 feet above the touchdown zone elevation, on the ILS CAT II approach. It also marks progress during a CAT III approach. (See Instrument Landing System) (Refer to AIM)

INSTRUMENT APPROACH PROCEDURE/IAP/INSTRUMENT APPROACH— A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually. It is prescribed and approved for a specific airport by competent authority. (See Segments of an Instrument Approach Procedure) (Refer to FAR Part 91, AIM)

1. U. S. civil standard instrument approach procedures are approved by the FAA as prescribed under FAR, Part 97, and are available for public use.
2. U.S. military standard instrument approach procedures are approved and published by the Department of Defense.
3. Special instrument approach procedures are approved by the FAA for individual operators, but are not published in FAR, Part 97, for public use.

ICAO—INSTRUMENT APPROACH PROCEDURE— A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

INSTRUMENT FLIGHT RULES/IFR— Rules governing the procedures for conducting instrument flight. Also a term used by pilots and controllers to indicate type of flight plan. (See Visual Flight Rules, Instrument Meteorological Conditions, Visual Meteorological Conditions) (Refer to AIM)

ICAO—INSTRUMENT FLIGHT RULES—A set of rules governing the conduct of flight under instrument meteorological conditions.

INSTRUMENT LANDING SYSTEM/ILS— A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer (See Localizer)
2. Glide Slope (See Glide Slope)
3. Outer Marker (See Outer Marker)
4. Middle Marker (See Middle Marker)
5. Approach Lights (See Airport Lighting)

(Refer to FAR Part 91, AIM)

INSTRUMENT METEOROLOGICAL CONDITIONS/IMC— Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling less than the minima specified for visual meteorological conditions. (See Visual Meteorological Conditions, Instrument Flight Rules, Visual Flight Rules)

INSTRUMENT RUNWAY— A runway equipped with electronic and visual navigation aids for which a precision or nonprecision approach procedure having straight-in landing minimums has been approved.

ICAO—INSTRUMENT RUNWAY—A runway intended for the operation of aircraft using nonvisual aids and comprising:

1. Instrument Approach Runway—An instrument runway served by a nonvisual aid providing at least directional guidance adequate for a straight-in approach.
2. Precision Approach Runway, Category I—An instrument runway served by ILS or GCA approach aids and visual aids intended for operations down to 60 metres (200 feet) decision height and down to an RVR of the order of 800 metres (2,600 feet.)
3. Precision Approach Runway, Category II—An instrument runway served by ILS and visual aids intended for operations down to 30 metres (100 feet) decision height and down to an RVR of the order of 400 metres (1,200 feet.)

4. Precision Approach Runway, Category III—An instrument runway served by ILS (no decision height being applicable) and:
   - a. By visual aids intended for operations down to an RVR of the order of 200 metres (700 feet);
   - b. By visual aids intended for operations down to an RVR of the order of 50 metres (150 feet);
   - c. Intended for operations without reliance on external visual reference.

INTERMEDIATE APPROACH SEGMENT— (See Segments of an Instrument Approach Procedure)

INTERMEDIATE FIX/IF— The fix that identifies the beginning of the intermediate approach segment of an instrument approach procedure. The fix is not normally identified on the instrument approach chart as an intermediate fix (IF). (See Segments of an Instrument Approach Procedure)

INTERNATIONAL AIRPORT— Relating to international flight, it means:

1. An airport of entry which has been designated by the Secretary of Treasury or Commissioner of Customs as an international airport for customs service.
2. A landing rights airport at which specific permission to land must be obtained from customs authorities in advance of contemplated use.
3. Airports designated under the Convention on International Civil Aviation as an airport for use by international commercial air transport and/or international general aviation. (Refer to Airport/Facility Directory and IFIM).

ICAO—INTERNATIONAL AIRPORT—Any airport designated by the Contracting State in whose territory it is situated as an airport of entry and departure for international air traffic, where the formalities incident to customs, immigration, public health, animal and plant quarantine, and similar procedures are carried out.

INTERNATIONAL CIVIL AVIATION ORGANIZATION/ICAO— A specialized agency of the United Nations whose objective is to develop the principles and techniques of international air navigation and to foster planning and development of international civil air transport.

INTERNATIONAL FLIGHT INFORMATION MANUAL/IFIM— A publication designed primarily as a pilot's preflight planning guide for flights into foreign airspace and for flights returning to the U.S. from foreign locations.

INTERROGATOR— The ground-based surveillance radar beacon transmitter-receiver, which normally scans in synchronism with a primary radar, transmitting discrete radio signals which repetitiously request all transponders, on the mode being used, to reply. The replies received are mixed with the primary radar returns and displayed on the same plan position indicator (radar scope). Also applied to the airborne element of the TACAN/DME system. (See Transponder) (Refer to AIM)

INTERSECTING RUNWAYS— Two or more runways which cross or meet within their lengths. (See Intersection)

INTERSECTION—

1. A point defined by any combination of courses, radials or bearings of two or more navigational aids.
2. Used to describe the point where two runways, a runway and a taxiway, or two taxiways cross or meet.

INTERSECTION DEPARTURE/INTERSECTION TAKEOFF— A takeoff or proposed takeoff on a runway from an intersection. (See Intersection)

***I SAY AGAIN*—** The message will be repeated.

JAMMING— Electronic or mechanical interference which may disrupt the display of aircraft on radar or the transmission/reception of radio communications/navigation.

JET BLAST— Jet engine exhaust (thrust stream turbulence). (See Wake Turbulence)

JET ROUTE— A route designed to serve aircraft operations from 18,000 feet MSL up to and including flight level 450. The routes are referred to as "J" routes with numbering to identify the designated route; e.g., J105. (See Route) (Refer to FAR Part 71)

JET STREAM— A migrating stream of high-speed winds present at high altitudes.

JETTISONING OF EXTERNAL STORES— Airborne release of external stores; e.g., tiptanks, ordinances (See Fuel Dumping) (Refer to FAR Part 91)

JOINT USE RESTRICTED AREA— (See Restricted Area)

KNOWN TRAFFIC— With respect to ATC clearances, means aircraft whose altitude, position and intentions are known to ATC.

LANDING/TAKEOFF AREA— Any locality either on land, water, or structures, including airports/heliports and intermediate landing fields, which is used, or intended to be used, for the landing and takeoff of aircraft whether or not facilities are provided for the shelter, servicing, or for receiving or discharging passengers or cargo.

ICAO—LANDING AREA—That part of the movement area intended for the landing and takeoff of aircraft.

LANDING DIRECTION INDICATOR— A device which visually indicates the direction in which landings and takeoffs should be made. (See Tetrahedron) (Refer to AIM)

LANDING MINIMUMS/IFR LANDING MINIMUMS— The minimum visibility prescribed for landing a civil aircraft while using an instrument approach procedure. The minimum applies with other limitations set forth in FAR Part 91 with respect to the Minimum Descent Altitude (MDA) or Decision Height (DH) prescribed in the instrument approach procedures as follows:

1. Straight-in landing minimums—A statement of MDA and visibility, or DH and visibility, required for straight-in landing on a specified runway, or
2. Circling minimums— A statement of MDA and visibility required for the circle-to-land maneuver.

Descent below the established MDA or DH is not authorized during an approach unless the aircraft is in a position from which a normal approach to the runway of intended landing can be made and adequate visual reference to required visual cues is maintained. (See Straight-in Landing, Circle-to-Land Maneuver, Decision Height, Minimum Descent Altitude, Visibility, Instrument Approach Procedure) (Refer to FAR Part 91)

LANDING ROLL— The distance from the point of touchdown to the point where the aircraft can be brought to a stop or exit the runway.

LANDING SEQUENCE— The order in which aircraft are positioned for landing. (See Approach Sequence)

LAST ASSIGNED ALTITUDE— The last altitude/flight level assigned by ATC and acknowledged by the pilot. (See Maintain) (Refer to FAR Part 91)

LATERAL SEPARATION— The lateral spacing of aircraft at the same altitude by requiring operation on different routes or in different geographical locations. (See Separation)

LIGHTED AIRPORT— An airport where runway and obstruction lighting is available. (See Airport Lighting) (Refer to AIM)

LIGHT GUN— A handheld directional light signaling device which emits a brilliant narrow beam of white, green, or red light as selected by the tower controller. The color and type of light transmitted can be used to approve or disapprove anticipated pilot actions where radio communication is not available. The light gun is used for controlling traffic operating in the vicinity of the airport and on the airport movement area. (Refer to AIM)

LOCALIZER— The component of an ILS which provides course guidance to the runway. (See Instrument Landing System) (Refer to AIM)

ICAO—LOCALIZER COURSE (ILS)— The locus of points, in any given horizontal plane, at which the DDM (difference in depth of modulation) is zero.

LOCALIZER TYPE DIRECTIONAL AID/LDA— A NAVAID used for nonprecision instrument approaches with utility and accuracy comparable to a localizer but which is not a part of a complete ILS and is not aligned with the runway. (Refer to AIM)

LOCALIZER USABLE DISTANCE— The maximum distance from the localizer transmitter at a specified altitude, as verified by flight inspection, at which reliable course information is continuously received. (Refer to AIM)

LOCAL TRAFFIC— Aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from flight in local practice areas, or aircraft executing practice instrument approaches at the airport. (See Traffic Pattern)

LONGITUDINAL SEPARATION— The longitudinal spacing of aircraft at the same altitude by a minimum distance expressed in units of time or miles. (See Separation) (Refer to AIM)

LORAN/LONG RANGE NAVIGATION— An electronic navigational system by which hyperbolic lines of position are determined by measuring the difference in the time of reception of synchronized pulse signals from two fixed transmitters. Loran A operates in the 1750—1950 kHz frequency band. Loran C and D operate in the 100—110 kHz frequency band. (Refer to AIM)

LOST COMMUNICATIONS/TWO-WAY RADIO COMMUNICATIONS FAILURE— Loss of the ability to communicate by radio. Aircraft are sometimes referred to as NORDO (No Radio). Standard pilot procedures are specified in FAR Part 91. Radar controllers issue procedures for pilots to follow in the event of lost communications during a radar approach when weather reports indicate that an aircraft will likely encounter IFR weather conditions during the approach. (Refer to FAR Part 91, AIM)

LOW ALTITUDE AIRWAY STRUCTURE/FEDERAL AIRWAYS— The network of airways serving aircraft operations up to but not including 18,000 feet MSL. (See Airway) (Refer to AIM)

LOW ALTITUDE ALERT, CHECK YOUR ALTITUDE IMMEDIATELY— (See Safety Advisory)

LOW ALTITUDE ALERT SYSTEM/LAAS— An automated function of the TPX-42 that alerts the controller when a Mode C transponder-equipped aircraft on an IFR flight plan is below a predetermined minimum safe altitude. If requested by the pilot, LAAS monitoring is also available to VFR Mode C transponder-equipped aircraft.

LOW APPROACH— An approach over an airport or runway following an instrument approach or a VFR approach including the go-around maneuver where the pilot intentionally does not make contact with the runway. (Refer to AIM)

LOW FREQUENCY/LF— The frequency band between 30 and 300 kHz. (Refer to AIM)

MACH NUMBER— The ratio of true airspeed to the speed of sound; e.g., MACH .82, MACH 1.6. (See Airspeed)

MAINTAIN—

1. Concerning altitude/flight level, the term means to remain at the altitude/flight level specified. The phrase "climb and" or "descend and" normally precedes "maintain" and the altitude assignment; e.g., "descend and maintain 5,000."
2. Concerning other ATC instructions, the term is used in its literal sense; e.g., maintain VFR.

MAKE SHORT APPROACH— Used by ATC to inform a pilot to alter his traffic pattern so as to make a short final approach. (See Traffic Pattern)

MANDATORY ALTITUDE— An altitude depicted on an instrument Approach Procedure Chart requiring the aircraft to maintain altitude at the depicted value.

MARKER BEACON— An electronic navigation facility transmitting a 75 MHz vertical fan or boneshaped radiation pattern. Marker beacons are identified by their modulation frequency and keying code, and when received by compatible airborne equipment, indicate to the pilot, both aurally and visually, that he is passing over the facility. (See Outer Marker, Middle Marker, Inner Marker) (Refer to AIM)

MAXIMUM AUTHORIZED ALTITUDE/MAA— A published altitude representing the maximum usable altitude or flight level for an airspace structure or route segment. It is the highest altitude on a Federal airway, Jet route, area navigation low or high route, or other direct route for which an MEA is designated in FAR Part 95 at which adequate reception of navigation and signals is assured.

MAYDAY— The international radiotelephony distress signal. When repeated three times, it indicates imminent and grave danger and that immediate assistance is requested. (See PAN) (Refer to AIM)

METEOROLOGICAL IMPACT STATEMENT/MIS— An unscheduled planning forecast describing conditions expected to begin within 4 to 12 hours which may impact the flow of air traffic in a specific center's (ARTCC) area.

METERING— A method of time-regulating arrival traffic flow into a terminal area so as not to exceed a predetermined terminal acceptance rate.

METERING FIX— A fix along an established route from over which aircraft will be metered prior to entering terminal airspace. Normally, this fix should be established at a distance from the airport which will facilitate a profile descent 10,000 feet above airport elevation (AAE) or above.

MIA— (See Minimum IFR Altitudes)

MICROWAVE LANDING SYSTEM/MLS— An instrument landing system operating in the microwave spectrum which provides lateral and vertical guidance to aircraft having compatible avionics equipment. (See Instrument Landing System) (Refer to AIM)

MIDDLE COMPASS LOCATOR— (See Compass Locator)

MIDDLE MARKER/MM— A marker beacon that defines a point along the glide slope of an ILS normally located at or near the point of decision height (ILS Category I). It is keyed to transmit alternate dots and dashes, with the alternate dots and dashes keyed at the rate of 95 dot/dash combinations per minute, on a 1300 Hz tone, which is received aurally and visually by compatible airborne equipment. (See Marker Beacon, Instrument Landing System) (Refer to AIM)

MID RVR— (See Visibility)

MILITARY AUTHORITY ASSUMES RESPONSIBILITY FOR SEPARATION OF AIRCRAFT/MARSA— A condition whereby the military services involved assume responsibility for separation between participating military aircraft in the ATC system. It is used only for required IFR operations which are specified in letters of agreement or other appropriate FAA or military documents.

MILITARY OPERATIONS AREA/MOA— (See Special Use Airspace)

MILITARY TRAINING ROUTES/MTR— Airspace of defined vertical and lateral dimensions established for the conduct of military flight training at airspeeds in excess of 250 knots IAS. (See IFR (IR) and VFR (VR) Military Training Routes)

MINIMUM CROSSING ALTITUDE/MCA— The lowest altitude at certain fixes at which an aircraft must cross when proceeding in the direction of a higher minimum en route IFR altitude (MEA). (See Minimum En Route IFR Altitude)

MINIMUM DESCENT ALTITUDE/MDA— The lowest altitude, expressed in feet above mean sea level, to which descent is authorized on final approach or during circle-to-land maneuvering in execution of a standard instrument approach procedure where no electronic glide slope is provided. (See Nonprecision Approach Procedure)

MINIMUM EN ROUTE IFR ALTITUDE/MEA— The lowest published altitude between radio fixes which assures acceptable navigational signal coverage and meets obstacle clearance requirements between those fixes. The MEA prescribed for a Federal airway or segment thereof, area navigation low or high route or other direct route applies to the entire width of the airway, segment or route between the radio fixes defining the airway, segment, or route. (Refer to FAR Parts 91 and 95; AIM)

MINIMUM FUEL— Indicates that an aircraft's fuel supply has reached a state where, upon reaching the destination, it can accept little or no delay. This is not an emergency situation but merely indicates an emergency situation is possible should any undue delay occur. (Refer to AIM)

MINIMUM HOLDING ALTITUDE/MHA— The lowest altitude prescribed for a holding pattern which assures navigational signal coverage, communications, and meets obstacle clearance requirements.

MINIMUM IFR ALTITUDES/MIA— Minimum altitudes for IFR operations as prescribed in FAR Part 91. These altitudes are published on aeronautical charts and prescribed in FAR Part 95 for airways and routes, and in FAR Part 97 for standard instrument approach procedures. If no applicable minimum altitude is prescribed in FAR Parts 95 or 97, the following minimum IFR altitude applies:

1. In designated mountainous areas, 2,000 feet above the highest obstacle within a horizontal distance of 5 statute miles from the course to be flown; or

2. Other than mountainous areas, 1,000 feet above the highest obstacle within a horizontal distance of 5 statute miles from the course to be flown; or

3. As otherwise authorized by the Administrator or assigned by ATC. (See Minimum En Route IFR Altitude, Minimum Obstruction Clearance Altitude, Minimum Crossing Altitude, Minimum Safe Altitude, Minimum Vectoring Altitude) (Refer to FAR Part 91)

MINIMUM OBSTRUCTION CLEARANCE ALTITUDE/MOCA— The lowest published altitude in effect between radio fixes on VOR airways, off-airway routes, or route segments which meets obstacle clearance requirements for the entire route segment and which assures acceptable navigational signal coverage only within 25 statute (22 nautical) miles of a VOR. (Refer to FAR Part 91 and 95)

MINIMUM RECEPTION ALTITUDE/MRA— The lowest altitude at which an intersection can be determined. (Refer to FAR Part 95)

MINIMUM SAFE ALTITUDE/MSA—

1. The minimum altitude specified in FAR Part 91 for various aircraft operations.
2. Altitudes depicted on approach charts which provide at least 1,000 feet of obstacle clearance for emergency use within a specified distance from the navigation facility upon which a procedure is predicated. These altitudes will be identified as MINIMUM SECTOR ALTITUDES or EMERGENCY SAFE ALTITUDES and are established as follows:
   a. Minimum Sector Altitudes—Altitudes depicted on approach charts which provide at least 1,000 feet of obstacle clearance within a 25-mile radius of the navigation facility upon which the procedure is predicated. Sectors depicted on approach charts must be at least 90 degrees in scope. These altitudes are for emergency use only and do not necessarily assure acceptable navigational signal coverage.

ICAO—MINIMUM SECTOR ALTITUDE— The lowest altitude which may be used under emergency conditions which will provide a minimum clearance of 300 meters (1,000 feet) above all obstacles located in an area contained within a sector of a circle of 25 nautical mile radius centered on a radio aid to navigation.

   b. Emergency Safe Altitudes—Altitudes depicted on approach charts which provide at least 1,000 feet of obstacle clearance in nonmountainous areas and 2,000 feet of obstacle clearance in designated mountainous areas within a 100-mile radius of the navigation facility upon which the procedure is predicated and normally used only in military procedures. These altitudes are identified on published procedures as "Emergency Safe Altitudes."

MINIMUM SAFE ALTITUDE WARNING (MSAW)— A function of the ARTS III computer that aids the controller by alerting him when a tracked Mode C equipped aircraft is below or is predicted by the computer to go below a predetermined minimum safe altitude. (Refer to AIM)

MINIMUMS/MINIMA— Weather condition requirements established for a particular operation or type of operation; e.g., IFR takeoff or landing, alternate airport for IFR flight plans, VFR flight, etc. (See Landing Minimums, IFR Takeoff Minimums, VFR Conditions, IFR Conditions) (Refer to FAR Part 91, AIM)

MINIMUM VECTORING ALTITUDE/MVA— The lowest MSL altitude at which an IFR aircraft will be vectored by a radar controller, except as otherwise authorized for radar approaches, departures and missed approaches. The altitude meets IFR obstacle clearance criteria. It may be lower than the published MEA along an airway or J-route segment. It may be utilized for radar vectoring only upon the controller's determination that an adequate radar return is being received from the aircraft being controlled. Charts depicting minimum vectoring altitudes are normally available only to the controllers and not to pilots. (Refer to AIM)

MISSED APPROACH—

1. A maneuver conducted by a pilot when an instrument approach cannot be completed to a landing. The route of flight and altitude are shown on instrument approach procedure charts. A pilot executing a missed approach prior to the Missed Approach Point (MAP) must continue along the final approach to the MAP. The pilot may climb immediately to the altitude specified in the missed approach procedure.
2. A term used by the pilot to inform ATC that he is executing the missed approach.
3. At locations where ATC radar service is provided, the pilot should conform to radar vectors, when provided by ATC, in lieu of the published missed approach procedure. (See Missed Approach Point) (Refer to AIM)

ICAO—MISSED APPROACH PROCEDURE— The procedure to be followed if, after an instrument approach, a landing is not effected, and occuring normally:

1. When the aircraft has descended to the decision height and has not established visual contact, or
2. When directed by air traffic control to pull up or to go around again.

MISSED APPROACH POINT/MAP— A point prescribed in each instrument approach procedure at which a missed approach procedure shall be executed if the required visual reference does not exist. (See Missed Approach, Segments of an Instrument Approach Procedure)

MISSED APPROACH SEGMENT— (See Segments of an Instrument Approach Procedure)

MODE— The letter or number assigned to a specific pulse spacing of radio signals transmitted or received by ground interrogator or airborne transponder components of the Air Traffic Control Radar Beacon System (ATCRBS). Mode A (military Mode 3) and Mode C (altitude reporting) are used in air traffic control. (See Transponder, Interrogator, Radar) (Refer to AIM)

ICAO—MODE (SSR MODE)— The letter or number assigned to a specific pulse spacing of the interrogation signals transmitted by an interrogator. There are 4 modes, A, B, C and D corresponding to four different interrogation pulse spacings.

MOVEMENT AREA— The runways, taxiways, and other areas of an airport/heliport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports/heliports with a tower, specific approval for entry onto the movement area must be obtained from ATC.

ICAO—MOVEMENT AREA— That part of an aerodrome intended for the surface movement of aircraft, including the maneuvering area and aprons.

MOVING TARGET INDICATOR/MTI— An electronic device which will permit radar scope presentation only from targets which are in motion. A partial remedy for ground clutter.

MSAW— (See Minimum Safe Altitude Warning)

NAS STAGE A— The en route ATC system's radar, computers and computer programs, controller plan view displays (PVDs/Radar Scopes), input/output devices, and the related communications equipment which are integrated to form the heart of the automated IFR air traffic control system. This equipment performs Flight Data Processing (FDP) and Radar Data Processing (RDP). It interfaces with automated terminal systems and is used in the control of en route IFR aircraft. (Refer to AIM)

NATIONAL AIRSPACE SYSTEM/NAS— The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower and material. Included are system components shared jointly with the military.

NATIONAL BEACON CODE ALLOCATION PLAN AIRSPACE/NBCAP AIRSPACE— Airspace over United States territory located within the North American continent between Canada and Mexico, including adjacent territorial waters outward to about boundaries of oceanic control areas (CTA)/Flight Information Regions (FIR). (See Flight Information Region)

NATIONAL FLIGHT DATA CENTER/NFDC— A facility in Washington D.C., established by FAA to operate a central aeronautical information service for the collection, validation, and dissemination of aeronautical data in support of the activities of government, industry, and the aviation community. The information is published in the National Flight Data Digest. (See National Flight Data Digest)

NATIONAL FLIGHT DATA DIGEST/NFDD— A daily (except weekends and federal holidays) publication of flight information appropriate to aeronautical charts, aeronautical publications, Notices to Airmen or other media serving the purpose of providing operational flight data essential to safe and efficient aircraft operations.

NATIONAL SEARCH AND RESCUE PLAN— An interagency agreement which provides for the effective utilization of all available facilities in all types of search and rescue missions.

NAVAID CLASSES— VOR, VORTAC, and TACAN aids are classed according to their operational use. The three classes of NAVAIDS are:

T—Terminal

L—Low altitude

H—High altitude

The normal service range for T, L, and H class aids is found in the AIM. Certain operational requirements make it necessary to use some of these aids at greater service ranges than specified. Extended range is made possible through flight inspection determinations. Some aids also have lesser service range due to location, terrain, frequency protection, etc. Restrictions to service range are listed in Airport/Facility Directory.

NAVIGABLE AIRSPACE— Airspace at and above the minimum flight altitudes prescribed in the FARs including airspace needed for safe takeoff and landing. (Refer to FAR Part 91)

NAVIGATIONAL AID/NAVAID— Any visual or electronic device airborne or on the surface which provides point to point guidance information or position data to aircraft in flight. (See Air Navigation Facility)

NDB— (See Nondirectional beacon)

NEGATIVE— "No" or "permission not granted" or "that is not correct."

NEGATIVE CONTACT— Used by pilots to inform ATC that:

1. Previously issued traffic is not in sight. It may be followed by the pilot's request for the controller to provide assistance in avoiding the traffic.
2. They were unable to contact ATC on a particular frequency.

NIGHT— The time between the end of evening civil twilight and the beginning of morning civil twilight, as published in the American Air Almanac, converted to local time.

ICAO—NIGHT— The hours between the end of evening civil twilight and the beginning of morning civil twilight or such other period between sunset and sunrise as may be specified by the appropriate authority.

NO GYRO APPROACH/VECTOR— A radar approach/vector provided in case of a malfunctioning gyro-compass or directional gyro. Instead of providing the pilot with headings to be flown, the controller observes the radar track and issues control instructions "turn right/left" or "stop turn" as appropriate. (Refer to AIM)

NONAPPROACH CONTROL TOWER— Authorizes aircraft to land or takeoff at the airport controlled by the tower, or to transit the airport traffic area. The primary function of a nonapproach control tower is the sequencing of aircraft in the traffic pattern and on the landing area. Nonapproach control towers also separate aircraft operating under instrument flight rules clearances from approach controls and centers. They provide ground control services to aircraft, vehicles, personnel, and equipment on the airport movement area.

NONCOMPOSITE SEPARATION— Separation in accordance with minima other than the composite separation minimum specified for the area concerned.

NONDIRECTIONAL BEACON/RADIO BEACON/NDB— An L/MF or UHF radio beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his bearing to or from the radio beacon and "home" on or track to or from the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator. (See Compass Locator, Automatic Direction Finder)

NONPRECISION APPROACH PROCEDURE/NONPRECISION APPROACH— A standard instrument approach procedure in which no electronic glide slope is provided; e.g., VOR, TACAN, NDB, LOC, ASR, LDA, or SDF approaches.

NONRADAR— Precedes other terms and generally means without the use of radar, such as:

1. Nonradar Route—A flight path or route over which the pilot is performing his own navigation. The pilot may be receiving radar separation, radar monitoring or other ATC services while on a nonradar route. (See Radar Route)
2. Nonradar Approach—Used to describe instrument approaches for which course guidance on final approach is not provided by ground based precision or surveillance radar. Radar vectors to the final approach course may or may not be provided by ATC. Examples of nonradar approaches are VOR, ADF, TACAN, and ILS, approaches. (See Final Approach—IFR, Final Approach Course, Radar Approach, Instrument Approach Procedure)
3. Nonradar Separation—The spacing of aircraft in accordance with established minima without the use of radar; e.g., vertical, lateral, or longitudinal separation. (See Radar Separation)

ICAO—NonRadar Separation— The separation used when aircraft position information is derived from sources other than radar.

4. Nonradar Arrival—An arriving aircraft that is not being vectored to the final approach course for an instrument approach or towards the airport for a visual approach. The aircraft may or may not be in a radar environment and may or may not be receiving radar separation, radar monitoring or other services provided by ATC. (See Radar Arrival, Radar Environment)

NONRADAR APPROACH CONTROL— An ATC facility providing approach control service without the use of radar. (See Approach Control, Approach Control Service)

NORDO— (See Lost Communications)

NORTH AMERICAN ROUTE— A numerically coded route preplanned over existing airway and route systems to and from specific coastal fixes serving the North Atlantic. North American Routes consist of the following:

1. Common Route/Portion—That segment of a North American route between the inland navigation facility and the coastal fix.
2. Non-Common Route/Portion—That segment of a North American route between the inland navigation facility and a designated North American terminal.
3. Inland Navigation Facility—A navigation aid on a North American route at which the common route and/or the non-common route begins or ends.
4. Coastal Fix—A navigation aid or intersection where an aircraft transitions between the domestic route structure and the oceanic route structure.

NOTICES TO AIRMEN PUBLICATION— A publication designed primarily as a pilot's operational manual containing current NOTAM information considered essential to the safety of flight as well as supplemental data to other aeronautical publications. (See Notice to Airmen/NOTAM)

NOTICE TO AIRMEN/NOTAM— A notice containing information (not known sufficiently in advance to publicize by other means) concerning the establishment, condition or change in any component (facility, service, or procedure of, or hazard in the National Airspace System) the timely knowledge of which is essential to personnel concerned with flight operations.

1. NOTAM(D)—A NOTAM given (in addition to local dissemination) distant dissemination via teletypewriter beyond the area of responsibility of the Flight Service Station. These NOTAMS will be stored and repeated hourly until cancelled.
2. NOTAM(L)—A NOTAM given local dissemination by voice, (teletypewriter where applicable), and a wide variety of means such as: telautograph, teleprinter, facsimile reproduction, hot line, telecopier, telegraph, and telephone to satisfy local user requirements.
3. FDC NOTAM—A notice to airmen, regulatory in nature, transmitted by NFDC and given all-circuit dissemination.

ICAO—NOTAM— A notice, containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.

NUMEROUS TARGETS VICINITY (LOCATION)— A traffic advisory issued by ATC to advise pilots that targets on the radar scope are too numerous to issue individually. (See Traffic Advisories)

OBSTACLE— An existing object, object of natural growth, or terrain at a fixed geographical location, or which may be expected at a fixed location within a prescribed area, with reference to which vertical clearance is or must be provided during flight operation.

OBSTRUCTION— Any object/obstacle exceeding the obstruction standards specified by FAR Part 77, Subpart C.

OBSTRUCTION LIGHT— A light, or one of a group of lights, usually red or white, frequently mounted on a surface structure or natural terrain to warn pilots of the presence of an obstruction.

OFF-ROUTE VECTOR— A vector by ATC which takes an aircraft off a previously assigned route. Altitudes assigned by ATC during such vectors provide required obstacle clearance.

OFFSET PARALLEL RUNWAYS— Staggered runways having centerlines which are parallel.

ON COURSE—

1. Used to indicate that an aircraft is established on the route centerline.
2. Used by ATC to advise a pilot making a radar approach that his aircraft is lined up on the final approach course. (See On-Course Indication)

ON-COURSE INDICATION— An indication on an instrument which provides the pilot a visual means of determining that the aircraft is located on the centerline of a given navigational track; or an indication on a radar scope that an aircraft is on a given track.

OPTION APPROACH— An approach requested and conducted by a pilot which will result in either a touch-and-go, missed approach, low approach, stop-and-go or full stop landing. (See Cleared for the option) (Refer to AIM)

ORGANIZED TRACK SYSTEM— A moveable system of oceanic tracks that traverses the North Atlantic between Europe and North America the physical position of which is determined twice daily taking the best advantage of the winds aloft.

OUT— The conversation is ended and no response is expected.

OUTER COMPASS LOCATOR— (See Compass Locator)

OUTER FIX— A general term used within ATC to describe fixes in the terminal area, other than the final approach fix. Aircraft are normally cleared to these fixes by an Air Route Traffic Control Center or an Approach Control Facility. Aircraft are normally cleared from these fixes to the final approach fix or final approach course.

OUTER MARKER/OM— A marker beacon at or near the glide slope intercept altitude of an ILS approach. It is keyed to transmit two dashes per second on a 400 Hz tone which is received aurally and visually by compatible airborne equipment. The OM is normally located four to seven miles from the runway threshold on the extended centerline of the runway. (See Marker Beacon, Instrument Landing System) (Refer to AIM)

OVER— My transmission is ended; I expect a response.

OVERHEAD APPROACH/360 OVERHEAD— A series of predetermined maneuvers prescribed for VFR arrival of military aircraft (often in formation) for entry into the VFR traffic pattern and to proceed to a landing. The pattern usually specifies the following:

1. The radio contact required of the pilot.
2. The speed to be maintained.
3. An initial approach 3 to 5 miles in length.
4. An elliptical pattern consisting of two 180 degree turns.
5. A break point at which the first 180 degree turn is started.
6. The direction of turns.
7. Altitude (at least 500 feet above the conventional pattern).
8. A "Roll-out" on final approach not less than 1/4 mile from the landing threshold and not less than 300 feet above the ground.

PAN— The international radio-telephony urgency signal. When repeated three times indicates uncertainty or alert, followed by nature of urgency. (See MAYDAY) (Refer to AIM)

PARALLEL ILS APPROACHES— ILS approaches to parallel runways by IFR aircraft which, when established inbound toward the airport on the adjacent localizer courses, are radar-separated by at least 2 miles. (See Simultaneous ILS Approaches).

PARALLEL OFFSET ROUTE— A parallel track to the left or right of the designated or established airway/route. Normally associated with Area Navigation (RNAV) operations. (See Area Navigation)

PARALLEL RUNWAYS— Two or more runways at the same airport whose centerlines are parallel. In addition to runway number, parallel runways are designated as L (left) and R (right) or, if three parallel runways exist, L (left), C (center), and R (right).

PERMANENT ECHO— Radar signals reflected from fixed objects on the earth's surface; e.g., buildings, towers, terrain. Permanent echoes are distinguished from "ground clutter' by being definable locations rather than large areas. Under certain conditions they may be used to check radar alignment.

PHOTO RECONNAISSANCE (PR)— Military activity that requires locating individual photo targets and navigating to the targets at a preplanned angle and altitude. The activity normally requires a lateral route width of 16NM and altitude range of 1,500 feet to 10,000 feet AGL.

PILOT BRIEFING/PRE-FLIGHT PILOT BRIEFING— A service provided by the FSS to assist pilots in flight planning. Briefing items may include weather information, NOTAMS, military activities, flow control information and other items as requested. (Refer to AIM)

PILOT IN COMMAND— The pilot responsible for the operation and safety of an aircraft during flight time. (Refer to FAR Part 91)

PILOTS AUTOMATIC TELEPHONE WEATHER ANSWERING SERVICE/PATWAS— A continuous telephone recording containing current and forecast weather information for pilots. (See Flight Service Station) (Refer to AIM)

PILOT'S DISCRETION— When used in conjunction with altitude assignments, means that ATC has offered the pilot the option of starting climb or descent whenever he wishes and conducting the climb or descent at any rate he wishes. He may temporarily level off at any intermediate altitude. However, once he has vacated an altitude he may not return to that altitude.

PILOT WEATHER REPORT/PIREP— A report of meteorological phenomena encountered by aircraft in flight. (Refer to AIM)

POSITION REPORT/PROGRESS REPORT— A report over a known location as transmitted by an aircraft to ATC. (Refer to AIM)

POSITION SYMBOL— A computer generated indication shown on a radar display to indicate the mode of tracking.

POSITIVE CONTROL— The separation of all air traffic, within designated airspace, by air traffic control. (See Positive Control Area)

POSITIVE CONTROL AREA/PCA— (See Controlled Airspace)

PRACTICE INSTRUMENT APPROACH— An instrument approach procedure conducted by a VFR or IFR aircraft for the purpose of pilot training or proficiency demonstrations.

PRECIPITATION— Any or all forms of water particles (rain, sleet, hail, or snow), that fall from the atmosphere and reach the surface.

PRECISION APPROACH PROCEDURE/PRECISION APPROACH— A standard instrument approach procedure in which an electronic glide slope is provided, e.g., ILS and PAR. (See Instrument Landing System, Precision Approach Radar)

PRECISION APPROACH RADAR/PAR— Radar equipment in some ATC facilities operated by the FAA, and/or the military services at joint-use civil/military locations and separate military installations, to detect and display azimuth, elevation, and range of aircraft on the final approach course to a runway. This equipment may be used to monitor certain nonradar approaches, but is primarily used to conduct a precision instrument approach (PAR) wherein the controller issues guidance instructions to the pilot based on the aircraft's position in relation to the final approach course (azimuth), the glide path (elevation), and the distance (range) from the touchdown point on the runway as displayed on the radar scope. (See Glide Path) (Refer to AIM)

The abbreviation "PAR" is also used to denote preferential arrival routes in ARTCC computers. (See Preferential Routes)

*ICAO-PRECISION APPROACH RADAR/PAR—*Primary radar equipment used to determine the position of an aircraft during final approach, in terms of lateral and vertical deviations relative to a nominal approach path, and in range relative to touchdown.

PREFERENTIAL ROUTES— Preferential routes (PDRs, PARs, and PDARs) are adapted in ARTCC computers to accomplish inter/intra-facility controller coordination and to assure that flight data is posted at the proper control positions. Locations having a need for these specific inbound and outbound routes normally publish such routes in local facility bulletins and their use by pilots minimizes flight plan route amendments. When the workload or traffic situation permits, controllers normally provide radar vectors or assign requested routes to minimize circuitous routing. Preferential routes are usually confined to one ARTCC's area and are referred to by the following names or acronyms:

1. Preferential Departure Route/PDR—A specific departure route from an airport or terminal area to an en route point where there is no further need for flow control. It may be included in a Standard Instrument Departure (SID) or a Preferred IFR Route.
2. Preferential Arrival Route/PAR—A specific arrival route from an appropriate en route point to an airport or terminal area. It may be included in a Standard Terminal Arrival Route (STAR) or a Preferred IFR Route. The abbreviation "PAR" is used primarily within the ARTCC and should not be confused with the abbreviation for Precision Approach Radar.
3. Preferential Departure and Arrival Route/PDAR—A route between two terminals which are within or immediately adjacent to one ARTCC's area. PDARs are not synonomous with Preferred IFR Routes but may be listed as such as they do accomplish essentially the same purpose. (See Preferred IFR Routes, NAS Stage A)

PREFERRED IFR ROUTES— Routes established between busier airports to increase system efficiency and capacity. They normally extend through one or more ARTCC areas and are designed to achieve balanced traffic flows among high density terminals. IFR clearances are issued on the basis of these routes except when severe weather avoidance procedures or other factors dictate otherwise. Preferred IFR Routes are listed in the Airport/Facility Directory. If a flight is planned to or from an area having such routes but the departure or arrival point is not listed in the Airport/Facility Directory, pilots may use that part of a Preferred IFR Route which is appropriate for the departure or arrival point that is listed. Preferred IFR Routes are correlated with SIDs and STARs and may be defined by airways, jet routes, direct routes between NAVAIDs, Waypoints, NAVAID radials/DME, or any combinations thereof. (See Standard Instrument Departure, Standard Terminal Arrival Rout

Preferential Routes, Center's Area) (Refer to Airport/Facility Directory and Notices to Airmen Publication)

PREVAILING VISIBILITY— (See Visibility)

PROCEDURE TURN INBOUND— That point of a procedure turn maneuver where course reversal has been completed and an aircraft is established inbound on the intermediate approach segment or final approach course. A report of "procedure turn inbound" is normally used by ATC as a position report for separation purposes. (See Final Approach Course, Procedure Turn, Segments of an Instrument Approach Procedure)

PROCEDURE TURN/PT— The maneuver prescribed when it is necessary to reverse direction to establish an aircraft on the intermediate approach segment or final approach course. The outbound course, direction of turn, distance within which the turn must be completed, and minimum altitude are specified in the procedure. However, unless otherwise restricted, the point at which the turn may be commenced, and the type and rate of turn, are left to the discretion of the pilot.

ICAO—PROCEDURE TURN— A maneuver in which a turn is made away from a designated track followed by a turn in the opposite direction, both turns being executed so as to permit the aircraft to intercept and proceed along the reciprocal of the designated track.

PROFILE DESCENT— An uninterrupted descent (except where level flight is required for speed adjustment; e.g., 250 knots at 10,000 feet MSL) from cruising altitude/level to interception of a glide slope or to a minimum altitude specified for the initial or intermediate approach segment of a nonprecision instrument approach. The profile descent normally terminates at the approach gate or where the glide slope or other appropriate minimum altitude is intercepted.

PROGRAMMABLE INDICATOR DATA PROCESSOR/PIDP— The PIDP is a modification to the AN/TPX-42 interrogator system currently installed in fixed RAPCONs. The PIDP detects, tracks, and predicts secondary radar aircraft targets. These are displayed by means of computer-generated symbols and alphanumeric characters depicting flight identification, aircraft altitude, ground speed, and flight plan data. Although primary radar targets are not tracked, they are displayed coincident with the secondary radar targets as well as with the other symbols and alphanumerics. The system has the capability of interfacing with ARTCCs.

PROHIBITED AREA— (See Special Use Airspace).

ICAO—PROHIBITED AREA— An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited.

PROPOSED BOUNDARY CROSSING TIME/PBCT— Each center has a PBCT parameter for each internal airport. Proposed internal flight plans are transmitted to the adjacent center if the flight time along the proposed route from the departure airport to the center boundary is less than or equal to the value of PBCT or if airport adaptation specifies transmission regardless of PBCT.

PUBLISHED ROUTE— A route for which an IFR altitude has been established, and published, e.g., Federal Airways, Jet Routes, Area Navigation Routes, Specified Direct Routes.

QUADRANT— A quarter part of a circle, centered on a NAVAID, oriented clockwise from magnetic north as follows: NE quadrant 000-089, SE quadrant 090-179, SW quadrant 180-269, NW quadrant 270-359.

QUICK LOOK— A feature of NAS Stage A and ARTS which provides the controller the capability to display full data blocks of tracked aircraft from other control positions.

QUOTA FLOW CONTROL/QFLOW— A flow control procedure by which the Central Flow Control Function (CFCF) restricts traffic to the ARTC Center area having an impacted airport thereby avoiding sector/area saturation. (See Air Traffic Control Systems Command Center) (Refer to Airport/Facility Directory)

RADAR/RADIO DETECTION AND RANGING— A device which, by measuring the time interval between transmission and reception of radio pulses and correlating the angular orientation of the radiated antenna beam or beams in azimuth and/or elevation, provides information on range, azimuth, and/or elevation of objects in the path of the transmitted pulses.

1. Primary Radar—A radar system in which a minute portion of a radio pulse transmitted from a site is reflected by an object and then received back at that site for processing and display at an air traffic control facility.
2. Secondary Radar/Radar Beacon/ATCRBS—A radar system in which the object to be detected is fitted with cooperative equipment in the form of a radio receiver/transmitter (transponder). Radar pulses transmitted from the searching transmitter/receiver (interrogator) site are received in the cooperative equipment and used to trigger a distinctive transmission from the transponder. This reply transmission rather than a reflected signal, is then received back at the transmitter/receiver site for processing and display at an air traffic control facility. (See Transponder, Interrogator) (Refer to AIM)

ICAO—RADAR— A radio detection device which provides information on range, azimuth, and/or elevation of objects.

1. Primary Radar—A radar system which uses reflected radio signals.
2. Secondary Radar—A radar system wherein a radio signal transmitted from a radar station initiates the transmission of a radio signal from another station.

RADAR ADVISORY— The provision of advice and information based on radar observations. (See Advisory Service)

RADAR APPROACH— An instrument approach procedure which utilizes Precision Approach Radar (PAR) or Airport Surveillance Radar (ASR). (See PAR Approach, Surveillance Approach, Airport Surveillance

Radar, Precision Approach Radar, Instrument Approach Procedure) (Refer to AIM)

ICAO—RADAR APPROACH— An approach, executed by an aircraft, under the direction of a radar controller.

RADAR APPROACH CONTROL FACILITY— A terminal ATC facility that uses radar and nonradar capabilities to provide approach control services to aircraft arriving, departing, or transiting airspace controlled by the facility (see Approach Control Service). Provides radar ATC services to aircraft operating in the vicinity of one or more civil and/ or military airports in a terminal area. The facility may provide services of a ground controlled approach (GCA); i.e., ASR and PAR approaches. A radar approach control facility may be operated by FAA, USAF, US Army, USN, USMC, or jointly by FAA and a military service. Specific facility nomenclatures are used for administrative purposes only and are related to the physical location of the facility and the operating service generally as follows:

Army Radar Approach Control/ARAC (Army).

Radar Air Traffic Control Facility/ RATCF (Navy/FAA).

Radar Approach Control/RAPCON (Air Force/ FAA).

Terminal Radar Approach Control/TRACON (FAA).

Tower/Airport Traffic Control Tower/ATCT (FAA). (Only those towers delegated approach control authority.)

RADAR ARRIVAL— An arriving aircraft which is being vectored to the final approach course for an instrument approach or toward the airport for a visual approach. (See Radar Approach, Visual Approach)

RADAR BEACON— (See Radar)

RADAR CONTACT—

1. Used by ATC to inform an aircraft that it is identified on the radar display and radar flight following will be provided until radar identification is terminated. Radar service may also be provided within the limits of necessity and capability. When a pilot is informed of "radar contact" he automatically discontinues reporting over compulsory reporting points. (See Radar Flight Following, Radar Contact Lost, Radar Service, Radar Service Terminated). (Refer to AIM)
2. The term used to inform the controller that the aircraft is identified and approval is granted for the aircraft to enter the receiving controllers airspace.

ICAO—RADAR CONTACT— The situation which exists when the radar blip of a particular aircraft is seen and identified on a radar display.

RADAR CONTACT LOST— Used by ATC to inform a pilot that radar identification of his aircraft has been lost. The loss may be attributed to several things including the aircraft merging with weather or ground clutter, the aircraft flying below radar line of sight, the aircraft entering an area of poor radar return or a failure of the aircraft transponder or ground radar equipment. (See Clutter, Radar Contact)

RADAR ENVIRONMENT— An area in which radar service may be provided. (See Radar Contact, Radar Service, Additional Services, Traffic Advisories)

RADAR FLIGHT FOLLOWING— The observation of the progress of radar identified aircraft, whose primary navigation is being provided by the pilot, wherein the controller retains and correlates the aircraft identity with the appropriate target or target symbol displayed on the radar scope. (See Radar Contact, Radar Service) (Refer to AIM)

RADAR IDENTIFICATION— The process of ascertaining that an observed radar target is the radar return from a particular aircraft. (See Radar Contact, Radar Service)

*ICAO—RADAR IDENTIFICATION—*The process of correlating a particular radar blip with a specific aircraft.

RADAR IDENTIFIED AIRCRAFT— An aircraft, the position of which has been correlated with an observed target or symbol on the radar display. (See Radar Contract, Radar Contact Lost)

RADAR MONITORING— (See Radar Service)

RADAR NAVIGATIONAL GUIDANCE— (See Radar Service)

RADAR POINT OUT/POINT OUT— Used between controllers to indicate radar handoff action where the initiating controller plans to retain communications with an aircraft penetrating the other controller's airspace and additional coordination is required.

RADAR ROUTE— A flight path or route over which an aircraft is vectored. Navigational guidance and altitude assignments are provided by ATC. (See Flight Path, Route)

RADAR SEPARATION— (See Radar Service)

RADAR SERVICE— A term which encompasses one or more of the following services based on the use of radar which can be provided by a controller to a pilot of a radar identified aircraft.

1. Radar Separation.—Radar spacing of aircraft in accordance with established minima.

ICAO—RADAR SEPARATION— The separation used when aircraft position information is derived from radar sources.

2. Radar Navigational Guidance.—Vectoring aircraft to provide course guidance.
3. Radar Monitoring.—The radar flight following of aircraft, whose primary navigation is being performed by the pilot, to observe and note deviations from its authorized flight path, airway, or route. When being applied specifically to radar monitoring of instrument approaches, i.e., with precision approach radar (PAR) or radar monitoring of simultaneous ILS approaches, it includes advice and instructions whenever an aircraft nears or exceeds the prescribed PAR safety limit

or simultaneous ILS no transgression zone. (See Additional Services, Traffic Advisories)

ICAO—RADAR MONITORING— The use of radar for the purpose of providing aircraft with information and advice relative to significant deviations from nominal flight path.

ICAO—RADAR SERVICE— Term used to indicate a service provided directly by means of radar.

RADAR SERVICE TERMINATED— Used by ATC to inform a pilot that he will no longer be provided any of the services that could be received while under radar contact. Radar service is automatically terminated, and the pilot is not advised in the following cases:

1. An aircraft cancels its IFR flight plan, except within a TCA, TRSA, or where Stage II service is provided.
2. At the completion of a radar approach.
3. When an arriving VFR aircraft receiving radar services is advised to contact the tower.
4. When an aircraft conducting a visual approach or contact approach is advised to contact the tower.
5. When an aircraft making an instrument approach has landed or the tower has the aircraft in sight, whichever occurs first.

RADAR SURVEILLANCE— The radar observation of a given geographical area for the purpose of performing some radar function.

RADAR TRAFFIC ADVISORIES— (See Traffic Advisories)

RADAR TRAFFIC INFORMATION SERVICE— (See Traffic Advisories)

RADAR WEATHER ECHO INTENSITY LEVELS— Existing radar systems cannot detect turbulence. However, there is a direct correlation between the degree of turbulence and other weather features associated with thunderstorms and the radar weather echo intensity. The National Weather Service has categorized six (6) levels of radar weather echo intensity. The following list gives the weather features likely to be associated with these levels during thunderstorm weather situations:

1. Level 1 (WEAK) and Level 2 (MODERATE). Light to moderate turbulence is possible with lightning.
2. Level 3 (STRONG). Severe turbulence possible, lightning.
3. Level 4 (VERY STRONG). Severe turbulence likely, lightning.
4. Level 5 (INTENSE). Severe turbulence, lightning, organized wind gusts. Hail likely.
5. Level 6 (EXTREME). Severe turbulence, large hail, lightning, extensive wind gusts, and turbulence.

RADIAL— A magnetic bearing extending from a VOR/VORTAC/TACAN navigation facility.

RADIO—

1. A device used for communication.
2. Used to refer to a flight service station; e.g., "Seattle Radio" is used to call Seattle FSS.

RADIO ALTIMETER/RADAR ALTIMETER— Aircraft equipment which makes use of the reflection of radio waves from the ground to determine the height of the aircraft above the surface.

RADIO BEACON— (See Nondirectional Beacon)

RADIO MAGNETIC INDICATOR/RMI— An aircraft navigational instrument coupled with a gyro compass or similar compass that indicates the direction of a selected NAVAID and indicates bearing with respect to the heading of the aircraft.

RAMP— (See Apron)

READ BACK— Repeat my message back to me.

RECEIVING CONTROLLER/FACILITY— A controller/facility receiving control of an aircraft from another controller/facility.

REDUCE SPEED TO (SPEED)— (See Speed Adjustment)

RELEASE TIME— A departure time restriction issued to a pilot by ATC when necessary to separate a departing aircraft from other traffic.

ICAO—RELEASE TIME—Time prior to which an aircraft should be given further clearance or prior to which it should not proceed in case of radio failure.

REMOTE COMMUNICATIONS AIR/GROUND FACILITY/RCAG— An unmanned VHF/UHF transmitter/receiver facility which is used to expand ARTCC air/ground communications coverage and to facilitate direct contact between pilots and controllers. RCAG facilities are sometimes not equipped with emergency frequencies 121.5 MHz and 243.0 MHz. (Refer to AIM)

REMOTE COMMUNICATIONS OUTLET/RCO AND REMOTE TRANSMITTER/RECEIVER/RTR— An unmanned communications facility remotely controlled by air traffic personnel. RCO's serve FSS's. RTR's serve terminal ATC facilities. An RCO or RTR may be UHF or VHF and will extend the communication range of the air traffic facility. There are several classes of RCO's and RTR's. The class is determined by the number of transmitters or receivers. Classes A through G are used primarily for air/ground purposes. RCO and RTR class O facilities are nonprotected outlets subject to undetected and prolonged outages. RCO (O)'s and RTR (O)'s were established for the express purpose of providing ground-to-ground communications between air traffic control specialists and pilots located at a satellite airport for delivering en route clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/landing times. As a secondary function, they may be used for advisory purposes whenever the aircraft is below the coverage of the primary air/ground frequency.

REMOTE TRANSMITTER/RECEIVER/RTR— (See Remote Communications Outlet)

REPORT— Used to instruct pilots to advise ATC of specified information; e.g., "Report passing Hamilton VOR."

REPORTING POINT— A geographical location in relation to which the position of an aircraft is reported. (See Compulsory Reporting Point) (Refer to AIM)

ICAO—REPORTING POINT— A specified geographical location in relation to which the position of an aircraft can be reported.

REQUEST FULL ROUTE CLEARANCE/FRC— Used by pilots to request that the entire route of flight be read verbatim in an ATC clearance. Such request should be made to preclude receiving an ATC clearance based on the original filed flight plan when a filed IFR flight plan has been revised by the pilot, company, or operations prior to departure.

RESCUE COORDINATION CENTER/RCC— A search and rescue (SAR) facility equipped and manned to coordinate and control SAR operations in an area designated by the SAR plan. The U.S. Coast Guard and the U.S. Air Force have responsibility for the operation of RCCs.

ICAO—RESCUE CO-ORDINATION CENTRE— A unit responsible for promoting efficient organization of search and rescue service and for co-ordinating the conduct of search and rescue region.

RESTRICTED AREA— (See Special Use Airspace).

*ICAO—RESTRICTED AREA—*Airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions.

RESUME OWN NAVIGATION— Used by ATC to advise a pilot to resume his own navigational responsibility. It is issued after completion of a radar vector or when radar contact is lost while the aircraft is being radar vectored. (See Radar Contact Lost, Radar Service Terminated)

RNAV— (See Area Navigation)

RNAV APPROACH— An instrument approach procedure which relies on aircraft area navigation equipment for navigational guidance. (See Instrument Approach Procedure, Area Navigation)

ROAD RECONNAISSANCE (RC)— Military activity requiring navigation along roads, railroads and rivers. Reconnaissance route/route segments are seldom along a straight line and normally require a lateral route width of 10NM to 30NM and altitude range of 500 feet to 10,000 feet AGL.

ROGER— I have received all of your last transmission. It should not be used to answer a question requiring a yes or no answer. (See Affirmative, Negative)

ROLLOUT RVR— (See Visibility)

ROUTE— A defined path, consisting of one or more courses in a horizontal plane, which aircraft traverse over the surface of the earth. (See Airway, Jet Route, Published Route, Unpublished Route)

ROUTE SEGMENT— As used in Air Traffic Control, a part of a route that can be defined by two navigational fixes, two NAVAIDs, or a fix and a NAVAID. (See Fix, Route

*ICAO—ROUTE SEGMENT—*A portion of a route to be flown, as defined by two consecutive significant points specified in a flight plan.

RUNWAY— A defined rectangular area, on a land airport prepared for the landing and takeoff run of aircraft along its length. Runways are normally numbered in relation to their magnetic direction rounded off to the nearest 10 degrees. e.g., Runway 01, Runway 25. (See Parallel Runways)

*ICAO—RUNWAY—*A defined rectangular area, on a land aerodrome prepared for the landing and takeoff run of aircraft along its length.

RUNWAY CENTERLINE LIGHTING— (See Airport Lighting)

RUNWAY CONDITION READING/RCR— Numerical decelerometer readings relayed by air traffic controllers at USAF and certain civil bases for use by the pilot in determining runway braking action. These readings are routinely relayed only to USAF and Air National Guard Aircraft. (See Braking Action)

RUNWAY END IDENTIFIER LIGHTS— (See Airport Lighting)

RUNWAY GRADIENT— The average slope, measured in percent, between two ends or points on a runway. Runway gradient is depicted on Government aerodrome sketches when total runway gradient exceeds 0.3%.

RUNWAY HEADING— The magnetic direction indicated by the runway number. When cleared to "fly/maintain runway heading," pilots are expected to comply with the ATC clearance by flying the heading indicated by the runway number without applying any drift correction; e.g., Runway 4, 040° magnetic heading; Runway 20, 200° magnetic heading.

RUNWAY IN USE/ACTIVE RUNWAY/DUTY RUNWAY— Any runway or runways currently being used for takeoff or landing. When multiple runways are used, they are all considered active runways.

RUNWAY LIGHTS— (See Airport Lighting)

RUNWAY MARKINGS— (See Airport Marking Aids.)

RUNWAY PROFILE DESCENT— An instrument flight rules (IFR) air traffic control arrival procedure to a runway published for pilot use in graphic and/or textual form and may be associated with a STAR. Runway Profile Descents provide routing, and may depict crossing altitudes, speed restrictions, and headings to be flown from the en route structure to the point where the pilot will receive clearance for and execute an instrument approach procedure. A Runway Profile Descent may apply to more than one runway if so stated on the chart. (Refer to AIM)

RUNWAY USE PROGRAM— A noise abatement runway selection plan designed to enhance noise abatement efforts with regard to airport communities for arriving and departing aircraft. These plans are developed into runway use programs and apply to all turbojet aircraft 12,500 pounds or heavier; turbojet aircraft less than 12,500 pounds are included only if the airport proprietor determines that the aircraft creates a noise problem. Runway use programs are coordinated with FAA offices, and safety criteria used in these programs are developed by the Office of Flight Operations. Runway use programs are administered by the Air Traffic Service as "Formal" or "Informal" programs.

1. Formal Runway Use Program—An approved noise abatement program which is defined and acknowledged in a Letter of Understanding between Flight Operations, Air Traffic Service, the airport proprietor, and the users. Once established, participation in the program is mandatory for aircraft operators and pilots as provided for in FAR:91.87.
2. Informal Runway Use Program—An approved noise abatement program which does not require a Letter of Understanding, and participation in the program is voluntary for aircraft operators/pilots.

RUNWAY VISIBILITY VALUE— (See Visibility)

RUNWAY VISUAL RANGE— (See Visibility)

SAFETY ADVISORY— A safety advisory issued by ATC to aircraft under their control if ATC is aware the aircraft is at an altitude which, in the controller's judgment, places the aircraft in unsafe proximity to terrain, obstructions, or other aircraft. The controller may discontinue the issuance of further advisories if the pilot advises he is taking action to correct the situation or has the other aircraft in sight.

1. Terrain/Obstruction Advisory—A safety advisory issued by ATC to aircraft under their control if ATC is aware the aircraft is at an altitude which, in the controller's judgment, places the aircraft in unsafe proximity to terrain/obstructions, e.g., "Low Altitude Alert, check your altitude immediately."
2. Aircraft Conflict Advisory—A safety advisory issued by ATC to aircraft under their control if ATC is aware of an aircraft that is not under their control at an altitude which, in the controller's judgment, places both aircraft in unsafe proximity to each other. With the alert, ATC will offer the pilot an alternate course of action when feasible, e.g., "Traffic Alert, advise you turn right heading zero niner zero or climb to eight thousand immediately."

The issuance of a safety advisory is contingent upon the capability of the controller to have an awareness of an unsafe condition. The course of action provided will be predicated on other traffic under ATC control. Once the advisory is issued, it is solely the pilot's prerogative to determine what course of action, if any, he will take.

SAIL BACK— A maneuver during high wind conditions (usually with power off) where float plane movement is controlled by water rudders/opening and closing cabin doors.

SAY AGAIN— Used to request a repeat of the last transmission. Usually specifies transmission or portion thereof not understood or received, e.g., "Say again all after ABRAM VOR."

SAY ALTITUDE— Used by ATC to ascertain an aircraft's specific altitude/flight level. When the aircraft is climbing or descending, the pilot should state the indicated altitude rounded to the nearest 100 feet.

SAY HEADING— Used by ATC to request an aircraft heading. The pilot should state the actual heading of the aircraft.

SEA LANE— A designated portion of water outlined by visual surface markers for and intended to be used by aircraft designed to operate on water.

SEARCH AND RESCUE FACILITY— A facility responsible for maintaining and operating a search and rescue (SAR) service to render aid to persons and property in distress. It is any SAR unit, station, NET or other operational activity which can be usefully employed during an SAR Mission, e.g., a Civil Air Patrol Wing or a Coast Guard Station. (See Search and Rescue)

SEARCH AND RESCUE/SAR— A service which seeks missing aircraft and assists those found to be in need of assistance. It is a cooperative effort using the facilities and services of available Federal, state and local agencies. The U.S. Coast Guard is responsible for coordination of search and rescue for the Maritime Region and the U.S. Air Force is responsible for search and rescue for the Inland Region. Information pertinent to search and rescue should be passed through any air traffic facility or be transmitted directly to the Rescue Coordination Center by telephone. (See Flight Service Station, Rescue Coordination Center) (Refer to AIM)

SEE AND AVOID— A visual procedure wherein pilots of aircraft flying in visual meteorological conditions (VMC), regardless of type of flight plan, are charged with the responsibility to observe the presence of other aircraft and to maneuver their aircraft as required to avoid the other aircraft. Right-of-way rules are contained in FAR, Part 91. (See Instrument Flight Rules, Visual Flight Rules, Visual Meteorological Conditions, Instrument Meteorological Conditions)

SEGMENTED CIRCLE— A system of visual indicators designed to provide traffic pattern information at airports without operating control towers. (Refer to AIM)

SEGMENTS OF AN INSTRUMENT APPROACH PROCEDURE— An instrument approach procedure may have as many as four separate segments depending on how the approach procedure is structured.

1. Initial Approach—The segment between the initial approach fix and the intermediate fix or the point where the aircraft is established on the intermediate course or final approach course.
2. Intermediate Approach—The segment between the intermediate fix or point and the final approach fix.

3. Final Approach—The segment between the final approach fix or point and the runway, airport, or missed approach point.
4. Missed Approach—The segment between the missed approach point, or point of arrival at decision height, and the missed approach fix at the prescribed altitude. (Refer to FAR Part 97)

ICAO

1. *Initial Approach*—That part of an instrument approach procedure consisting of the first approach to the first navigational facility associated with the procedure, or to a predetermined fix.
2. *Intermediate Approach*—That part of an instrument approach procedure from the first arrival at the first navigational facility or predetermined fix, to the beginning of the final approach.
3. *Final Approach*—That part of an instrument approach procedure from the time the aircraft has:
    a. Completed the last procedure turn or base turn where one is specified, or
    b. Crossed a specified fix, or
    c. Intercepted the last track specified for the procedures until it has crossed a point in the vicinity of an aerodrome from which:
    (1) A landing can be made, or
    (2) A missed approach procedure is initiated.
4. *Missed Approach Procedure*—The procedure to be followed if, after an instrument approach, a landing is not effected and occurring normally:
    a. When the aircraft has descended to the decision height and has not established visual contact, or
    b. When directed by air traffic control to pull up or to go around again.

SEPARATION— In air traffic control, the spacing of aircraft to achieve their safe and orderly movement in flight and while landing and taking off. (See Separation Minima)

ICAO—SEPARATION—Spacing between aircraft, levels or tracks.

SEPARATION MINIMA— The minimum longitudinal, lateral, or vertical distances by which aircraft are spaced through the application of air traffic control procedures. (See Separation)

SEVERE WEATHER AVOIDANCE PLAN/SWAP— An approved plan to minimize the affect of severe weather on traffic flows in impacted terminal and/or ARTCC areas. SWAP is normally implemented to provide the least disruption to the ATC system when flight through portions of airspace is difficult or impossible due to severe weather.

SHORT RANGE CLEARANCE— A clearance issued to a departing IFR flight which authorizes IFR flight to a specific fix short of the destination while air traffic control facilities are coordinating and obtaining the complete clearance.

SHORT TAKEOFF AND LANDING AIRCRAFT/STOL AIRCRAFT— An aircraft which, at some weight within its approved operating weight, is capable of operating from a STOL runway in compliance with the applicable STOL characteristics, airworthiness, operations, noise, and pollution standards. (See Vertical Takeoff and Landing Aircraft)

SIDESTEP MANEUVER— A visual maneuver accomplished by a pilot at the completion of an instrument approach to permit a straight-in landing on a parallel runway not more than 1200 feet to either side of the runway to which the instrument approach was conducted. (Refer to AIM)

***SIGMET* /WS/SIGNIFICANT METEOROLOGICAL INFORMATION—** A weather advisory issued concerning weather significant to the safety of all aircraft. SIGMET advisories cover severe and extreme turbulence, severe icing, and widespread dust or sandstorms that reduce visibility to less than 3 miles. (See AIRMET and Convective SIGMET) (Refer to AIM).

ICAO—SIGMET INFORMATION— Information prepared by a meteorological watch office regarding the occurrence or expected occurrence of one or more of the following phenomena:

1. At subsonic cruising levels:
    Active thunderstorm area.
    Tropical revolving storm.
    Severe line squall.
    Heavy hail.
    Severe turbulence.
    Severe icing.
    Marked mountain waves.
    Widespread sandstorm/duststorm.
2. At transonic levels and supersonic cruising levels:
    Moderate or severe turbulence.
    Cumulonimbus clouds.
    Hail.

SIMPLIFIED DIRECTIONAL FACILITY/SDF— A NAVAID used for nonprecision instrument approaches. The final approach course is similar to that of an ILS localizer except that the SDF course may be offset from the runway, generally not more than 3 degrees, and the course may be wider than the localizer, resulting in a lower degree of accuracy. (Refer to AIM)

SIMULATED FLAMEOUT/SFO— A practice approach by a jet aircraft (normally military) at idle thrust to a runway. The approach may start at a relatively high altitude over a runway (high key) and may continue on a relatively high and wide downwind leg with a high rate of descent and a continuous turn to final. It terminates in a landing or low approach. The purpose of this approach is to simulate a flameout. (See Flameout)

SIMULTANEOUS ILS APPROACHES— An approach system permitting simultaneous ILS approaches to airports having parallel runways separated by at least 4,300 feet between centerlines. Integral parts of a total system are ILS, radar, communications, ATC procedures, and appropriate airborne equipment. (See Parallel Runways) (Refer to AIM)

SINGLE DIRECTION ROUTES— Preferred IFR Routes which are sometimes depicted on high altitude en route charts and which are normally flown in one direction only. (See Preferred IFR Route) (Refer to Airport/Facility Directory)

SINGLE FREQUENCY APPROACH/SFA— A service provided under a letter of agreement to military single-piloted turbojet aircraft which permits use of a single UHF frequency during approach for landing. Pilots will not normally be required to change frequency from the beginning of the approach to touchdown except that pilots conducting an en route descent are required to change frequency when control is transferred from the air route traffic control center to the terminal facility. The abbreviation "SFA" in the DOD FLIP IFR Supplement under "Communications" indicates this service is available at an aerodrome.

SINGLE-PILOTED AIRCRAFT— A military turbojet aircraft possessing one set of flight controls, tandem cockpits or two sets of flight controls but operated by one pilot is considered single-piloted by ATC when determining the appropriate air traffic service to be applied. (See Single Frequency Approach)

SLASH— A radar beacon reply displayed as an elongated target.

SLOW TAXI— To taxi a float plane at low power or low RPM.

SPEAK SLOWER— Used in verbal communications as a request to reduce speech rate.

SPECIAL EMERGENCY— A condition of air piracy, or other hostile act by a person(s) aboard an aircraft, which threatens the safety of the aircraft or its passengers.

SPECIAL IFR— (See Fixed-Wing Special IFR)

SPECIAL INSTRUMENT APPROACH PROCEDURE— (See Instrument Approach Procedure)

SPECIAL USE AIRSPACE— Airspace of defined dimensions identified by an area on the surface of the earth wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. TYPES OF SPECIAL USE AIRSPACE:

1. Alert Area—Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft. Alert Areas are depicted on aeronautical charts for the information of nonparticipating pilots. All activities within an Alert Area are conducted in accordance with Federal Aviation Regulations and pilots of participating aircraft as well as pilots transiting the area are equally responsible for collision avoidance.
2. Controlled Firing Area—Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons and property on the ground.
3. Military Operations Area (MOA)—An MOA is an airspace assignment of defined vertical and lateral dimensions established outside positive control areas to separate/segregate certain military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. (Refer to AIM).
4. Prohibited Area—Designated airspace within which the flight of aircraft is prohibited. (Refer to En Route Charts, AIM).
5. Restricted Area—Airspace designated under FAR, Part 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use and IFR/VFR operations in the area may be authorized by the controlling ATC facility when it is not being utilized by the using agency. Restricted areas are depicted on en route charts. Where joint use is authorized, the name of the ATC controlling facility is also shown. (Refer to FAR, Part 73 and AIM)
6. Warning Area—Airspace which may contain hazards to nonparticipating aircraft in international airspace.

SPECIAL VFR CONDITIONS— Weather conditions in a control zone which are less than basic VFR and in which some aircraft are permitted flight under Visual Flight Rules. (See Special VFR Operations) (Refer to FAR Part 91)

SPECIAL VFR OPERATIONS— Aircraft operating in accordance with clearances within control zones in weather conditions less than the basic VFR weather minima. Such operations must be requested by the pilot and approved by ATC. (See Special VFR Conditions)

*ICAO—SPECIAL VFR FLIGHT—*A controlled VFR flight authorized by air traffic control to operate within a control zone under meteorological conditions below the visual meteorological conditions.

SPEED— (See Airspeed, Groundspeed)

SPEED ADJUSTMENT— An ATC procedure used to request pilots to adjust aircraft speed to a specific value for the purpose of providing desired spacing. Pilots are expected to maintain a speed of plus or minus 10 knots or 0.02 mach number of the specified speed.

Examples of speed adjustments are:

1. "Increase/reduce speed to mach point (number)."
2. "Increase/reduce speed to (speed in knots)" or "Increase/reduce speed (number of knots) knots."
3. "If practical, reduce speed to (speed);" or "If practical, reduce speed (number of) knots."

SPEED BRAKES/DIVE BRAKES— Moveable aerodynamic devices on aircraft that reduce airspeed during descent and landing.

SQUAWK (Mode, Code, Function)— Activate specific modes/codes/functions on the aircraft transponder, e.g., "Squawk three/alpha, two one zero five, low." (See Transponder)

STAGE I/II/III SERVICE— (See Terminal Radar Program)

STANDARD INSTRUMENT APPROACH PROCEDURE— (See Instrument Approach Procedure)

STANDARD INSTRUMENT DEPARTURE/SID— A preplanned instrument flight rule (IFR) air traffic control departure procedure printed for pilot use in graphic and/or textual form. SIDs provide transition from the terminal to the appropriate en route structure. (See IFR Takeoff Minima and Departure Procedures) (Refer to AIM)

STANDARD RATE TURN— A turn of three degrees per second.

STANDARD TERMINAL ARRIVAL/STAR— A preplanned instrument flight rule (IFR) air traffic control arrival procedure published for pilot use in graphic and/or textual form. STARs provide transition from the en route structure to an outer fix or an instrument approach fix/arrival waypoint in the terminal area.

STAND BY— Means the controller or pilot must pause for a few seconds, usually to attend to other duties of a higher priority. Also means to wait as in "stand by for clearance." If a delay is lengthy, the caller should reestablish contact.

STATIONARY RESERVATIONS— Altitude reservations which encompass activities in a fixed area. Stationary reservations may include activities such as special test of weapons systems or equipment, certain U.S. Navy carrier, fleet, and anti-submarine operations, rocket, missile and drone operations, and certain aerial refueling or similar operations.

STEPDOWN FIX— A fix permitting additional descent within a segment of an instrument approach procedure by identifying a point at which a controlling obstacle has been safely overflown.

STEP TAXI— To taxi a float plane at full power or high RPM.

STEP TURN— A maneuver used to put a float plane in a planing configuration prior to entering an active sea lane for takeoff. The STEP TURN maneuver should only be used upon pilot request.

STEREO ROUTE— A routinely used route of flight established by users and ARTCCs identified by a coded name, e.g., ALPHA 2. These routes minimize flight plan handling and communications.

STOP ALTITUDE SQUAWK— Used by ATC to inform an aircraft to turn-off the automatic altitude reporting feature of its transponder. It is issued when the verbally reported altitude varies 300 feet or more from the automatic altitude report. (See Altitude Readout, Transponder)

STOP AND GO— A procedure wherein an aircraft will land, make a complete stop on the runway, and then commence a takeoff from that point. (See Low Approach, Option Approach)

STOPOVER FLIGHT PLAN— A flight plan format which permits, in a single submission, the filing of a sequence of flight plans through interim full-stop destinations to a final destination.

STOP SQUAWK (Mode or Code)— Used by ATC to tell the pilot to turn specified functions of the aircraft transponder off. (See Stop Altitude Squawk, Transponder)

STOP STREAM/BURST/BUZZER— Used by ATC to request a pilot to suspend electronic countermeasure activity. (See Jamming)

STOPWAY— An area beyond the takeoff runway designated by the airport authorities as able to support an airplane during an aborted takeoff. (Refer to FAR Part 1)

STRAIGHT-IN APPROACH—IFR— An instrument approach wherein final approach is begun without first having executed a procedure turn, not necessarily completed with a straight-in landing or made to straight-in landing minimums. (See Straight-in Landing, Landing Minimums, Straight-in Approach-VFR)

STRAIGHT-IN APPROACH—VFR— Entry into the traffic pattern by interception of the extended runway centerline (final approach course) without executing any other portion of the traffic pattern. (See Traffic Pattern)

STRAIGHT-IN LANDING— A landing made on a runway aligned within 30° of the final approach course following completion of an instrument approach. (See Straight-in Approach-IFR)

STRAIGHT-IN LANDING MINIMUMS/STRAIGHT-IN MINIMUMS— (See Landing Minimums)

SUBSTITUTE ROUTE— A route assigned to pilots when any part of an airway or route is unusable because of NAVAID status. These routes consist of:

1. Substitute routes which are shown on U.S. Government Charts.
2. Routes defined by ATC as specific NAVAID radials or courses.
3. Routes defined by ATC as direct to or between NAVAIDs.

SUNSET AND SUNRISE— The mean solar times of sunset and sunrise as published in the Nautical Almanac, converted to local standard time for the locality concerned. Within Alaska, the end of evening civil twilight and the beginning of morning civil twilight, as defined for each locality.

SURVEILLANCE APPROACH— An instrument approach wherein the air traffic controller issues instructions, for pilot compliance, based on aircraft position in relation to the final approach course (azimuth), and the distance (range) from the end of the runway as displayed on the controller's radar scope. The controller will provide recommended altitudes on final approach if requested by the pilot. (See PAR Approach) (Refer to AIM)

SYSTEM STRATEGIC NAVIGATION (SN)— Military activity accomplished by navigating along a preplanned route using internal aircraft systems to maintain a de- sired track. This activity normally requires a lateral route width of 10NM and altitude range of 1,000 feet to 6,000 feet AGL with some route segments that permit terrain following.

TACAN-ONLY AIRCRAFT— An aircraft, normally military, possessing TACAN with DME but no VOR navigational system capability. Clearances must specify TACAN or VORTAC fixes and approaches.

TACTICAL AIR NAVIGATION/TACAN— An ultra-high frequency electronic rho-theta air navigation aid which provides suitably equipped aircraft a continuous indication of bearing and distance to the TACAN station. (See VORTAC) (Refer to AIM)

TARGET— The indication shown on a radar display resulting from a primary radar return or a radar beacon reply. (See Radar, Target Symbol)

*ICAO—TARGET—*In radar:

1. Generally, any discrete object which reflects or retransmits energy back to the radar equipment.
2. Specifically, an object of radar search or surveillance.

TARGET SYMBOL— A computer-generated indication shown on a radar display resulting from a primary radar return or a radar beacon reply.

TAXI— The movement of an airplane under its own power on the surface of an airport (FAR Part 135.100-Note). Also, it describes the surface movement of helicopters equipped with wheels. (See Air Taxi, Hover Taxi) (Refer to AIM)

TAXI INTO POSITION AND HOLD— Used by ATC to inform a pilot to taxi onto the departure runway in takeoff position and hold. It is not authorization for takeoff. It is used when takeoff clearance cannot immediately be issued because of traffic or other reasons (See HOLD, CLEARED FOR TAKEOFF).

TAXI PATTERNS— Patterns established to illustrate the desired flow of ground traffic for the different runways or airport areas available for use.

TERMINAL AREA— A general term used to describe airspace in which approach control service or airport traffic control service is provided.

TERMINAL AREA FACILITY— A facility providing air traffic control service for arriving and departing IFR, VFR, Special VFR, Special IFR aircraft and on occasion, en route aircraft. (See Approach Control, Tower)

TERMINAL CONTROL AREA— (See Controlled Airspace)

TERMINAL RADAR PROGRAM— A national program instituted to extend the terminal radar services, provided IFR aircraft, to VFR aircraft. Pilot participation in the program is urged but is not mandatory. The program is divided into two parts and referred to as Stage II and Stage III. The Stage service provided at a particular location is contained in the Airport/Facility Directory.

1. Stage I originally comprised two basic radar services (traffic advisories and limited vectoring to VFR aircraft). These services are provided by all commissioned terminal radar facilities, but the term "Stage I" has been deleted from use.
2. Stage II/Radar Advisory and Sequencing for VFR Aircraft—Provides, in addition to the basic radar services, vectoring and sequencing on a full-time basis to arriving VFR aircraft. The purpose is to adjust the flow of arriving IFR and VFR aircraft into the traffic pattern in a safe and orderly manner and to provide traffic advisories to departing VFR aircraft.
3. Stage III/Radar Sequencing and Separation Service for VFR Aircraft—Provides, in addition to the basic radar services and Stage II, separation between all participating VFR aircraft. The purpose is to provide separation between all participating VFR aircraft and all IFR aircraft operating within the airspace defined as a Terminal Radar Service Area (TRSA) or Terminal Control Area (TCA). (See Controlled Airspace, Terminal Radar Service Area) (Refer to AIM, Airport/Facility Directory)

TERMINAL RADAR SERVICE AREA/TRSA— Airspace surrounding designated airports wherein ATC provides radar vectoring, sequencing and separation on a full-time basis for all IFR and participating VFR aircraft. Service provided in a TRSA is called Stage III Service. AIM contains an explanation of TRSA. TRSAs are depicted on VFR aeronautical charts. Pilot participation is urged but is not mandatory. (See Terminal Radar Program) (Refer to AIM, Airport/Facility Directory)

TERRAIN FOLLOWING/TF— The flight of a military aircraft maintaining a constant AGL altitude above the terrain or the highest obstruction. The altitude of the aircraft will constantly change with the varying terrain and/or obstruction.

TETRAHEDRON— A device normally located on uncontrolled airports and used as a landing direction indicator. The small end of a tetrahedron points in the direction of landing. At controlled airports, the tetrahedron, if installed, should be disregarded because tower instructions supersede the indicator. (See Segmented Circle) (Refer to AIM)

THAT IS CORRECT— The understanding you have is right.

THRESHOLD— The beginning of that portion of the runway usable for landing. (See Airport Lighting, Displaced Threshold)

THRESHOLD CROSSING HEIGHT/TCH— The theoretical height above the runway threshold at which the aircraft's glide slope antenna would be if the aircraft maintains the trajectory established by the mean ILS glidepath. (See Glide Slope, Threshold)

THRESHOLD LIGHTS— (See Airport Lighting)

TIME GROUP— Four digits representing the hour and minutes from the 24-hour clock. Time groups without time zone indicators are understood to be GMT (Greenwich Mean Time); e.g., "0205." A time zone designator is used to indicate local time; e.g., "0205M." The end and beginning of the day are shown by "2400" and "0000," respectively.

TORCHING— The burning of fuel at the end of an exhaust pipe or stack of a reciprocating aircraft engine, the result of an excessive richness in the fuel air mixture.

TOUCH-AND-GO/TOUCH-AND-GO LANDING— An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway.

TOUCHDOWN—

1. The point at which an aircraft first makes contact with the landing surface.
2. Concerning a precision radar approach (PAR), it is the point where the glide path intercepts the landing surface.

ICAO—TOUCHDOWN— The point where the nominal glide path intercepts the runway.

TOUCHDOWN RVR— (See Visibility)

TOUCHDOWN ZONE— The first 3,000 feet of the runway beginning at the threshold. The area is used for determination of Touchdown Zone Elevation in the development of straight-in landing minimums for instrument approaches.

TOUCHDOWN ZONE ELEVATION/TDZE— The highest elevation in the first 3,000 feet of the landing surface. TDZE is indicated on the instrument approach procedure chart when straight-in landing minimums are authorized. (See Touchdown Zone)

TOUCHDOWN ZONE LIGHTING— (See Airport Lighting)

TOWER/AIRPORT TRAFFIC CONTROL TOWER— A terminal facility that uses air/ground communications, visual signaling, and other devices to provide ATC services to aircraft operating in the vicinity of an airport or on the movement area. Authorizes aircraft to land or takeoff at the airport controlled by the tower or to transit the airport traffic area regardless of flight plan or weather conditions (IFR or VFR). A tower may also provide approach control services (radar or nonradar). (See Airport Traffic Area, Airport Traffic Control Service, Approach Control/Approach Control Facility, Approach Control Service, Movement Area, Tower En Route Control Service/Tower to Tower) (Refer to AIM)

ICAO—AERODROME CONTROL TOWER— A unit established to provide air traffc control service to aerodrome traffic.

TOWER EN ROUTE CONTROL SERVICE/TOWER TO TOWER— The control of IFR en route traffic within delegated airspace between two or more adjacent approach control facilities. This service is designed to expedite traffic and reduce control and pilot communication requirements.

TPX 42— A numeric beacon decoder equipment/system. It is designed to be added to terminal radar systems for beacon decoding. It provides rapid target identification, reinforcement of the primary radar target, and altitude information from Mode C. (See Automated Radar Terminal Systems, Transponder)

TRACK— The actual flight path of an aircraft over the surface of the earth. (See Course, Route, Flight Path)

*ICAO—TRACK—*The projection on the earth's surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from north (true, magnetic, or grid).

TRAFFIC—

1. A term used by a controller to transfer radar identification of an aircraft to another controller for the purpose of coordinating separation action. Traffic is normally issued (a) in response to a handoff or point out, (b) in anticipation of a handoff or point out, or (c) in conjunction with a request for control of an aircraft.
2. A term used by ATC to refer to one or more aircraft.

(Identification), TRAFFIC ALERT. ADVISE YOU TURN LEFT/RIGHT (specific heading if appropriate), AND/OR CLIMB/DESCEND (specific altitude if appropriate) IMMEDIATELY. (See Safety Advisory)

TRAFFIC ADVISORIES— Advisories issued to alert pilots to other known or observed air traffic which may be in such proximity to the position or intended route of flight of their aircraft to warrant his attention. Such advisories may be based on:

1. Visual observation.
2. Observation of radar identified and nonidentified aircraft targets on an ATC radar display, or
3. Verbal reports from pilots or other facilities.

The word "traffic" followed by additional information, if known, is used to provide such advisories; e.g., "Traffic, 2 o'clock, one zero miles, southbound, eight thousand."

Traffic advisory service will be provided to the extent possible depending on higher priority duties of the controller or other limitations, e.g., radar limitations, volume of traffic, frequency congestion or controller workload. Radar/nonradar traffic advisories do not relieve the pilot of his responsibility to see and avoid other aircraft. Pilots are cautioned that there are many times when the controller is not able to give traffic advisories concerning all traffic in the aircraft's proximity; in other words, when a pilot requests or is receiving traffic advisories, he should not assume that all traffic will be issued. (Refer to AIM, Radar Traffic Information Service)

TRAFFIC INFORMATION— (See Traffic Advisories)

TRAFFIC IN SIGHT— Used by pilots to inform a controller that previously issued traffic is in sight. (See Negative Contact, Traffic Advisories)

TRAFFIC NO LONGER A FACTOR— Indicates that the traffic described in a previously issued traffic advisory is no longer a factor.

READEX FICHE

TRAFFIC PATTERN— The traffic flow that is prescribed for aircraft landing at, taxiing on, or taking off from an airport. The components of a typical traffic pattern are upwind leg, crosswind leg, downwind leg, base leg and final approach.

1. Upwind Leg—A flight path parallel to the landing runway in the direction of landing.
2. Crosswind Leg—A flight path at right angles to the landing runway off its upwind end.
3. Downwind Leg—A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg.
4. Base Leg—A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline.
5. Final Approach—A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. An aircraft making a straight-in approach VFR is also considered to be on final approach.

(See Straight-In Approach-VFR, Taxi Patterns) (Refer to AIM, FAR Part 91)

ICAO—AERODROME TRAFFIC CIRCUIT— The specified path to be flown by aircraft operating in the vicinity of an aerodrome.

TRANSCRIBED WEATHER BROADCAST/TWEB— A continuous recording of meteorological and aeronautical information that is broadcast on L/MF and VOR facilities for pilots. (Refer to AIM)

TRANSFER OF CONTROL— That action whereby the responsibility for the separation of an aircraft is transferred from one controller to another.

ICAO—TRANSFER OF CONTROL— Transfer of responsibility for providing air traffic control service.

TRANSFERRING CONTROLLER/FACILITY— A controller/facility transferring control of an aircraft to another controller/facility.

ICAO—TRANSFERRING UNIT/CONTROLLER— Air Traffic Control Unit/Air Traffic Controller in the process of transferring the responsibility for providing air traffic control service to an aircraft to the next air traffic control unit/air traffic controller along the route of flight.

TRANSITION—

1. The general term that describes the change from one phase of flight or flight condition to another, e.g., transition from en route flight to the approach or transition from instrument flight to visual flight.
2. A published procedure (SID Transition) used to connect the basic SID to one of several en route airways/jet routes, or a published procedure (STAR Transition) used to connect one of several en route airways/jet routes to the basic STAR. (Refer to SID/STAR Charts)

TRANSITION AREA— (See Controlled Airspace)

TRANSMISSOMETER— An apparatus used to determine visibility by measuring the transmission of light through the atmosphere. It is the measurement source for determining runway visual range (RVR) and runway visibility value (RVV). (See Visibility)

TRANSMITTING IN THE BLIND/BLIND TRANSMISSION— A transmission from one station to other stations in circumstances where two-way communication cannot be established, but where it is believed that the called stations may be able to receive the transmission.

TRANSPONDER— The airborne radar beacon receiver/transmitter portion of the Air Traffic Control Radar Beacon System (ATCRBS) which automatically receives radio signals from interrogators on the ground, and selectively replies with a specific reply pulse or pulse group only to those interrogations being received on the mode to which it is set to respond. (See Interrogator) (Refer to AIM)

*ICAO—TRANSPONDER—*A receiver/transmitter which will generate a reply signal upon proper interrogation; the interrogation and reply being on different frequencies.

TURBOJET AIRCRAFT— An aircraft having a jet engine in which the energy of the jet operates a turbine which in turn operates the air compressor.

TURBOPROP AIRCRAFT— An aircraft having a jet engine in which the energy of the jet operates a turbine which drives the propeller.

T-VOR/TERMINAL-VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION— A very high frequency terminal omnirange station located on or near an airport and used as an approach aid. (See Navigational Aid, VOR)

TWO WAY RADIO COMMUNICATIONS FAILURE— (See Lost Communications)

ULTRAHIGH FREQUENCY/UHF— The frequency band between 300 and 3,000 MHz. The bank of radio frequencies used for military air/ground voice communications. In some instances this may go as low as 225 MHz and still be referred to as UHF.

UNABLE— Indicates inability to comply with a specific instruction, request, or clearance.

UNCONTROLLED AIRSPACE— Uncontrolled airspace is that portion of the airspace that has not been designated as continental control area, control area, control zone, terminal control area, or transition area and within which ATC has neither the authority nor the responsibility for exercising control over air traffic. (See Controlled Airspace)

UNDER THE HOOD— Indicates that the pilot is using a hood to restrict visibility outside the cockpit while simulating instrument flight. An appropriately rated pilot is required in the other control seat while this operation is being conducted. (Refer to FAR Part 91)

UNICOM— A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOMs are shown on aeronautical charts and publications. (Refer to AIM, Airport/Facility Directory)

UNPUBLISHED ROUTE— A route for which no minimum altitude is published or charted for pilot use. It may include a direct route between NAVAIDS, a radial, a radar vector, or a final approach course beyond the segments of an instrument approach procedure. (See Published Route, Route)

UPWIND LEG— (See Traffic Pattern)

URGENCY— A condition of being concerned about safety, and of requiring timely but not immediate assistance; a potential Distress condition.

ICAO—URGENCY— A condition concerning the safety of an aircraft or other vehicle, or of person on board or in sight, but which does not require immediate assistance.

VECTOR— A heading issued to an aircraft to provide navigational guidance by radar.

ICAO—RADAR VECTORING— Provision of navigational guidance to aircraft in the form of specific headings, based on the use of radar.

VERIFY— Request confirmation of information; e.g., "verify assigned altitude."

VERIFY SPECIFIC DIRECTION OF TAKEOFF (OR TURNS AFTER TAKEOFF)— Used by ATC to ascertain an aircraft's direction of takeoff and/or direction of turn after takeoff. It is normally used for IFR departures from an airport not having a control tower. When direct communication with the pilot is not possible, the request and information may be relayed through an FSS, dispatcher, or by other means. (See IFR Takeoff Minimums and Departure Procedures)

VERTICAL SEPARATION— Separation established by assignment of different altitudes or flight levels. (See Separation)

*ICAO—VERTICAL SEPARATION—*Separation between aircraft expressed in units of vertical distance.

VERTICAL TAKEOFF AND LANDING AIRCRAFT/VTOL AIRCRAFT— Aircraft capable of vertical climbs and/or descents and of using very short runways or small areas for takeoff and landings. These aircraft include, but are not limited to, helicopters. (See Short Takeoff and Landing Aircraft)

VERY HIGH FREQUENCY/VHF— The frequency band between 30 and 300 MHz. Portions of this band, 108 to 118 MHz, are used for certain NAVAIDS; 118 to 136 MHz are used for civil air/ground voice communications. Other frequencies in this band are used for purposes not related to air traffic control.

VERY LOW FREQUENCY/VLF— The frequency band between 3 and 30 kHz.

VFR AIRCRAFT/VFR FLIGHT— An aircraft conducting flight in accordance with visual flight rules. (See Visual Flight Rules)

VFR CONDITIONS— Weather conditions equal to or better than the minimum for flight under visual flight rules. The term may be used as an ATC clearance/instruction only when:

1. An IFR aircraft requests a climb/descent in VFR conditions.
2. The clearance will result in noise abatement benefits where part of the IFR departure route does not conform to an FAA approved noise abatement route or altitude.
3. A pilot has requested a practice instrument approach and is not on an IFR flight plan.

All pilots receiving this authorization must comply with the VFR visibility and distance from cloud criteria in FAR Part 91. Use of the term does not relieve controllers of their responsibility to separate aircraft in TCAs/TRSAs as required by FAA Handbook 7110.65. When used as an ATC clearance/instruction, the term may be abbreviated "VFR;" e.g., "MAINTAIN VFR," "CLIMB/DESCEND VFR," etc.

VFR-ON-TOP— ATC authorization for an IFR aircraft to operate in VFR conditions at any appropriate VFR altitude (as specified in FAR and as restricted by ATC). A pilot receiving this authorization must comply with the VFR visibility, distance from cloud criteria, and the minimum IFR altitudes specified in FAR Part 91. The use of this term does not relieve controllers of their responsibility to separate aircraft in TCAs/TRSAs as required by FAA Handbook 7110.65.

VFR MILITARY TRAINING ROUTES (VR)— Routes used by the Department of Defense and associated Reserve and Air Guard units for the purpose of conducting low-altitude navigation and tactical training under VFR below 10,000 feet MSL at airspeeds in excess of 250 knots IAS.

VFR NOT RECOMMENDED— An advisory provided by a flight service station to a pilot during a preflight or inflight weather briefing that flight under visual flight rules is not recommended. To be given when the current and/or forecasted weather conditions are at or below VFR minimums. It does not abrogate the pilot's authority to make his own decision.

VIDEO MAP— An electronically displayed map on the radar display that may depict data such as airports, heliports, runway centerline extensions, hospital emergency landing areas, NAVAIDS and fixes, reporting points, airway/route centerlines, boundaries, handoff points, special use tracks, obstructions, prominent geographic features, map alignment indicators, range accuracy marks, minimum vectoring altitudes.

VISIBILITY— The ability, as determined by atmospheric conditions and expressed in units of distance, to see and identify prominent unlighted objects by day and prominent lighted objects by night. Visbility is reported as statute miles, hundreds of feet or meters. (Refer to FAR Part 91, AIM)

1. Flight Visibility—The average forward horizontal distance, from the cockpit of an aircraft in flight, at which prominent unlighted objects may be

seen and identified by day and prominent lighted objects may be seen and identified by night.

ICAO—Flight Visibility—The visibility forward from the cockpit of an aircraft in flight.

2. Ground Visibility—Prevailing horizontal visibility near the earth's surface as reported by the United States National Weather Service or an accredited observer.

ICAO—Ground Visibility—The visibility at an aerodrome as reported by an accredited observer.

3. Prevailing Visibility—The greatest horizontal visibility equaled or exceeded throughout at least half the horizon circle which need not necessarily be continuous.
4. Runway Visibility Value/RVV—The visibility determined for a particular runway by a transmissometer. A meter provides a continuous indication of the visibility (reported in miles or fractions of miles) for the runway. RVV is used in lieu of prevailing visibility in determining minimums for a particular runway.
5. Runway Visual Range/RVR—An instrumentally derived value, based on standard calibrations, that represents the horizontal distance a pilot will see down the runway from the approach end. It is based on the sighting of either high intensity runway lights or on the visual contrast of other targets whichever yields the greater visual range. RVR, in contrast to prevailing or runway visibility, is based on what a pilot in a moving aircraft should see looking down the runway. RVR is horizontal visual range, not slant visual range. It is based on the measurement of a transmissometer made near the touchdown point of the instrument runway and is reported in hundreds of feet. RVR is used in lieu of RVV and/or prevailing visibility in determining minimums for a particular runway.
    a. Touchdown RVR—The RVR visibility readout values obtained from RVR equipment serving the runway touchdown zone.
    b. MID RVR—The RVR readout values obtained from RVR equipment located midfield of the runway.
    c. Rollout RVR—The RVR readout values obtained from RVR equipment located nearest the rollout end of the runway.

ICAO—Runway Visual Range—The maximum distance in the direction of takeoff or landing at which the runway or the specified lights or markers delineating it can be seen from a position above a specified point on its centerline at a height corresponding to the average eye-level of pilots at touchdown.

VISUAL APPROACH— An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

ICAO—VISUAL APPROACH—An approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed in visual reference to terrain.

VISUAL APPROACH SLOPE INDICATOR— (See Airport Lighting)

VISUAL DESCENT POINT/VDP— A defined point on the final approach course of a nonprecision straight-in approach procedure from which normal descent from the MDA to the runway touchdown point may be commenced, provided the approach threshold of that runway, or approach lights, or other markings identifiable with the approach end of that runway are clearly visible to the pilot.

VISUAL FLIGHT RULES/VFR— Rules that govern the procedures for conducting flight under visual conditions. The term "VFR" is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan. (See Instrument Flight Rules, Instrument Meteorological Conditions, Visual Meteorological Conditions) (Refer to FAR Part 91, AIM)

VISUAL HOLDING— The holding of aircraft at selected, prominent, geographical fixes which can be easily recognized from the air. (See Hold, Holding Fixes)

VISUAL METEOROLOGICAL CONDITIONS/VMC— Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima. (See Instrument Flight Rules, Instrument Meteorological Conditions, Visual Flight Rules)

VISUAL SEPARATION— A means employed by ATC to separate aircraft in terminal areas. There are two ways to effect this separation:

1. The tower controller sees the aircraft involved and issues instructions, as necessary, to ensure that the aircraft avoid each other.
2. A pilot sees the other aircraft involved and upon instructions from the controller provides his own separation by maneuvering his aircraft as necessary to avoid it. This may involve following another aircraft or keeping it in sight until it is no longer a factor. (See See and Avoid) (Refer to FAR Part 91)

VORTAC/VHF OMNIDIRECTIONAL RANGE/TACTICAL AIR NAVIGATION— A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance measuring equipment (DME) at one site. (See Distance Measuring Equipment, Navigational Aid TACAN, VOR) (Refer to AIM)

VORTICES/WING TIP VORTICES— Circular patterns of air created by the movement of an airfoil through the air when generating lift. As an airfoil moves through the atmosphere in sustained flight, an area of area of low pressure is created above it. The air flowing from the high pressure area to the low pressure area around and about the tips of the airfoil tends to roll up into two rapidly rotating vortices, cylindrical in shape. These vortices are the most predominant parts of aircraft wake turbulence and their rotational force is dependent upon the wing loading, gross weight, and speed of the generating aircraft. The vortices from medium to heavy aircraft can be of extremely high velocity and hazardous to smaller aircraft. (See Aircraft Classes Wake Turbulence) (Refer to AIM)

VOR/VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION— A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the National Airspace System. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature. Voice features may be used by ATC or FSS for transmitting instructions/information to pilots. (See Navigational Aid) (Refer to AIM)

VOT/VOR TEST SIGNAL— A ground facility which emits a test signal to check VOR receiver accuracy. Some VOT's are available to the user while airborne, and others are limited to ground use only. (Refer to FAR Part 91, AIM, Airport/Facility Directory)

WAKE TURBULENCE— Phenomena resulting from the passage of an aircraft through the atmosphere. The term includes vortices, thrust stream turbulence, jet blast, jet wash, propeller wash and rotor wash, both on the ground and in the air. (See Aircraft Classes, Jet Blast, Vortices) (Refer to AIM)

WARNING AREA— See Special Use Airspace.

WAYPOINT— (See Area Navigation)

WEATHER ADVISORY/INFLIGHT WEATHER ADVISORY— (See SIGMET, AIRMET)

WEATHER ADVISORY/WS/WST/WA/CWA— In aviation weather forecast practice, an expression of hazardous weather conditions not predicted in the area forecast, as they affect the operation of air traffic and as prepared by the NWS.

WHEN ABLE— When used in conjunction with ATC instructions, gives the pilot the latitude to delay compliance until a condition or event has been reconciled. Unlike "pilot discretion," when instructions are prefaced "when able," the pilot is expected to seek the first opportunity to comply. Once a maneuver has been initiated, the pilot is expected to continue until the specifications of the instructions have been met. "When able," should not be used when expeditious compliance is required.

WILCO— I have received your message, understand it, and will comply with it.

WIND SHEAR— A change in wind speed and/or wind direction in a short distance resulting in a tearing or shearing effect. It can exist in a horizontal or vertical direction and occasionally in both.

WORDS TWICE—

1. As a request: "Communication is difficult. Please say every phrase twice."
2. As information: "Since communications are difficult, every phrase in this message will be spoken twice."

Appendix B. AIRCRAFT WEIGHT CLASSES AND GROUPS

Manufacturer/Model	*Type Designator* *Civil*	*Type Designator* *Military*	*Weight Class/ Group*
Aeronca (USA)			
Aeronca Champion	AR58		S/2
Chief/Super Chief	AR11		S/2
Sedan	AR15		S/2
Aero Spaceline (USA)			
Guppy	AP52		L/5
Mini Guppy	AP3M		L/5
Pregnant Guppy	AP1P		L/5
Super Guppy/ Turbine	AP25/AP45		L/5
Aerospatiale (France)			
Caravelle	S210		L/4
Concorde	CONC		H/5
Corvette SN601	S601		L/3
Rallye MS 880/881/883	S880		S/3
Rallye Commodore MS 892	S892		S/2
Rallye Minerva MS 894	S894		S/2
Twin Star	S355		S/2
Airbus Industries (International)			
Airbus	A300		H/5
Alon, Inc. (USA)			
Aircope A2	F02		S/2
Andrie Tupolev (USSR)			
Tu-114	TU114		H/5
Tu-144	TU144		H/5
Antonov (USSR)			
AN-10	AN10		L/4
AN-12	AN12		L/5
Avro (A.V. Roe) (U.K.)			
Anson	AV52		L/3
CF-100		CF00	L/4
Lancaster	LANC		L/4
Shackleton		SHC3	L/4
Beagle Aircraft (U.K.)			
Airdale	BT10		S/2
Model 206S	BT6S		S/3
Beech Aircraft (USA)			
Airliner	BE99		S/2
Baron	BE55	T42	S/2
Baron 58	BE58		S/2
Bonanza 33	BE33		S/2
Bonanza 35	BE35		S/2
Bonanza 36	BE36		S/2
Duke	BE60		S/3
Duchess	BE76		S/2
King Air 90	BE90	U21	S/2
King Air 100	BE10		S/3
Mentor	BE45	T34	S/2
Queen Air 65/A65/70	BE65		S/2
Queen Air 89	BE80		S/2
Seminole		U8	S/2
Sierra 24	BE24		S/2
Skipper 77	BE77		S/2
Sport 19	BE19		S/2
Stagger Wing	BE17		S/2
Sundowner	BE23		S/2
Super H18	BE8S		S/2
Super King Air 200	BE20	C12	S/3
Super Queen 88	BE88		S/2
Travelair	BE95		S/2
Twin Beech 18	BE18	C45	S/2
Twin Bonanza	BE50		S/2
Bellanca Aircraft (Includes Downer/ Northern) (USA)			
Citabria	CH10		S/2
Citabria 7ECA	CH9		S/2
Cruisair Sr./Cruisemaster 14-19	BL14		S/2
Decathlon	BL30		S/2
Scout	BL28		S/2
Viking	BL26		S/2
Boeing Aircraft (USA)			
707 100/200	B707		L/5
707 300/400	H/B707		H/5
720	B720		L/5
720B	B72S		L/5
727	B727		L/4
737	B737	T43	L/4
747	B747	E4A	H/5A
747SP	B74S		H/5
757	B757		L/4
767	B767		H/5
AWACS		E3A	H/5
EC135		E135	L/5
Stearman	B75		S/2
Stratofortress		B52	H/5
Stratofreighter		KC97	L/4
Stratolifter B717		C135	L/5
Stratotanker KC135		KC135	L/5
VC37B		C137B	L/5
VC37C		C137C	H/5
YC14		YC14	L/4
Bristol Aircraft (U.K.)			
Britannia 310	BR31		L/5

Manufacturer/Model	Type Designator Civil	Type Designator Military	Weight Class/ Group
British Aerospace Corp. (U.K.)			
BAC 111	BA11		L/4
BAC 146/200	BA46		L/4
Harrier		AV8*	L/4
HS/DH 125-600/700	HS25		L/3
HS 748 Series	HS748		L/4
Super VC 10	BA15	VC15	H/5
Trident	HS21		L/4
Vanguard	VC9		L/4
VC 10	BA10	VC10	H/5
Viscount	VC7		L/4
Vulcan		VLCN	H/4
Briton Norman Ltd. (U.K.)			
Islander	BN2		S/2
Trislander-Mark 3	BN3		S/2
Bushmaster Aircraft Corp. (USA)			
Bushmaster 2000	BU20		L/3
Camair (USA)			
Model 480 (Twin Navion)	CM48		S/3
Yukon	CC06		L/4
Candair Ltd. (Canada)			
Argus	CL28	CP07	L/4
Challenger	CL60		L/4
Cosmopolitan, (Convair 540)	CL66/CV54	CC09	L/4
North Star	NSTR		L/4
Starfighter	CF04	F104*	L/5
Yukon (Freightliner)	CL44	CC06	L/5
Cessna Aircraft (USA)			
120	C120		S/2
140	C140		S/2
150	C150		S/2
152	C152		S/2
170	C170		S/2
172 Skyhawk	C172	T41	S/2
175 Skylark	C175		S/2
177 Cardinal	C177		S/2
180	C180		S/2
182	C182		S/2
185 Skywagon	C185		S/2
188 Agwagon	C188		S/2
190	C190		S/2
195	C195		S/2
205	C205		S/2
206	C206		S/2
207 Super Skywagon	C207		S/2
210	C210		S/2

Manufacturer/Model	Type Designator Civil	Type Designator Military	Weight Class/ Group
Crusader	C303		S/2
305/321 Bird Dog	C305	O1	S/2
310	C310	U3	S/2
318		T37*	S/2
318E Dragonfly		A37*	S/2
320 Skynight	C320		S/2
336 Skymaster	C336		S/2
337 Super Skymaster	C337	O2	S/2
340	C340		S/2
401	C401		S/2
402	C402		S/2
411	C411		S/2
414	C414		S/2
421	C421		S/2
Corsair	C425		S/2
441	C441		S/2
Citation I/II	C500		S/3
Citation III	C50S		S/3
Champion Aircraft Corp. (USA)			
Challenger	CH8		S/2
Lancer 402	CH40		S/2
Traveler/Tri-Traveler	CH7		S/2
Curtis Wright (USA)			
Commando	CW46	C46	L/3
Dassault (France)			
Falcon 10	DA10		L/3
Falcon 20	FFJ	HU25	L/3
Falcon 50	DA50		L/3
Mercure	DA01		L/5
Mercure 200	DA02		L/5
DeHaviland (Canada & U.K.)			
Beaver	DH2	U6	S/2
Buffalo	DH5	C8	L/3
Caribou	DH4	C7A	L/3
Chipmunk	DH1		S/2
Comet 2	DH62		L/5
Comet 4	DH64		L/5
Dash 7	DH7		L/2**
Dove (Devon)	DH10		S/2
Heron	DH11		S/2
Otter	DH3	U1	S/2
Turbo Beaver	DH2T		S/2
Twin Otter	DH6	U18	S/2
Dornier GmbH (West Germany)			
Dornier 27	DO27		S/3
Dornier 28	DO28		S/3
Embraer (Brazil)			
Bandeirante	E110		S/3

Manufacturer/Model	Type Designator Civil	Type Designator Military	Weight Class/ Group
Fairchild Industries (USA)			
A10		A10A*	L/4
Cornell	FA62		S/2
FH227	FA22		L/3
Friendship F27	FA27		L/3
Flying Box Car	FA24	C119	L/4
Pilatus/Peacemaker	PL6	AV23A	S/1
Provider		C123	L/4
Thunderchief		F105*	L/5
Fokker-VFW BV (Netherlands) (See VFW-Fokker)			
Foxjet International (USA)			
ST/600	FXJ		S/2
Gates Learjet Corp. (USA)			
23	LR23		S/3
24	LR24		L/3
25	LR25		L/4
35	LR35	C21	L/4
36	LR36		L/4
55	LR55		L/4
General Dynamics Corp. (USA)			
Canso/Catalina	CV14	PBY5	L/4
Convair 240	CV24		L/4
Convair 440	CV44		L/4
Convair 580	CV58		L/4
Convair 600	CV60		L/4
Convair 640	CV64		L/4
Convair 880	CV88		L/5
Convair 990	CV99		L/5
Delta Dagger		F102*	L/5
Delta Dart		F106*	L/5
F16A/B		F16*	L/5
F111/FB111		F111*	L/5
Liner/Samaritan	CV34	C131	L/4
Privateer		P4	L/4
Valiant 34	CV13		S/3
Grumman Aerospace Corp. (USA)			
Ag-Cat	G164		S/2
Albatross	G64	U16	L/3
American	AA1		S/2
American Tr-2	AA2		S/2
Cheetah/Tiger	AA5		S/2
Cougar	GA7		S/2
Cougar G93		F9*	L/5
Goose/Super Goose	G21		L/3
Greyhound		C2	L/4
Hawkeye		E2	L/5
Intruder		A6*	L/5
Mallard	G73		L/3
Mohawk	G134	OV1	S/3
Tiger		F11*	L/5
Tomcat		F14*	L/5
Tracer		E1	L/4
Tracker	G89	S2	L/4
Trader		C1	L/4
Widgeon/Super Widgeon	G44		L/3
Gulfstream Aerospace Corporation (USA)			
Gulfstream I	G159	VC4	L/4
Gulfstream II	G2	VC11	L/4
Gulfstream III	G3	C20	L/4
Hadley Page (U.K.)			
Jetstream	HP13		S/3
Hamburger Flugzeubau (West Germany)			
Hansajet	HF32		L/3
Hamilton Aviation (USA)			
Westwind	WSW		S/3
Helio Aircraft Co. (USA)			
Courier	HE1		S/1
Stallion	HE5	AU24	S/1
Super Courier/ Tri-Courier	HE3	U10	S/1
Howard Aero Mfg. (USA)			
Model 500 (WARO)	HW5		L/4
Ilyushin (USSR)			
IL-18	IL18		L/5
IL-38	IL38		L/4
IL-62	IL62		H/5
IL-76	IL76		H/5
Israel Aircraft Industries, Ltd. (Israel)			
Arava 101	RV01		L/3
Arava 201	RV02		L/3
Westwind 1123	WW23		L/4
Westwind 1124	WW24		L/4
Lake Aircraft (USA)			
LA-4-200 Buccaneer	LA4		S/2
Learavia Inc. (USA)			
Lear Fan	LRF		S/2
Lockheed Aircraft Corp. (USA)			
Constellation (649)	L649		L/5
Constellation (749)	L749	C121	L/5
Electra	L188		L/4
Galaxy		C5A	H/5

Manufacturer/Model	*Type Designator* *Civil*	 *Military*	*Weight Class/ Group*
Hercules	L100	C130	L/4
Jetstar	L329	C140	L/4
Lodestar	L18		L/3
Neptune		P2	L/4
Orion		P3	L/4
Reconnaissance		SR71*	L/5
Sea Star		T1*	L/5
Shooting Star		T33*/F80*	L/4
Starfighter		F104*	L/5
Starlifter		C141	H/5
Starliner	L164		L/5
Super Constellation	L49		L/5
Tri-Star	L101		H/5
U2		U2*TR-1*	S/5
Viking		S3A	L/4
YF12A		F12	L/4
Martin Co. (Division of Martin-Marietta Corp.,) (USA)			
202	M202		L/3
404	M404		L/3
Canberra		B57*	L/5
Maule (USA)			
M4/5	ML4		S/2
McDonnell-Douglas Aircraft (USA)			
DC-6B	DC6B		L/4
DC-7/7B	DC7		L/5
DC-8	DC8		L/5
DC-9	DC9	C9	L/4
DC-9/MD-80 Series	MD80		L/4
DC-10	DC10		H/5
Eagle		F15*	L/5
Invader		B26	L/4
Liftmaster	DC6	C118	L/4
Phantom II		F4*	L/4
Seven Seas/Speed Freighter	DC7C		L/5
Skyhawk		A4*	L/5
Skymaster	DC4	C54	L/4
Skynight		F10*	L/5
Skyraider		A1*	L/4
Skytrain	DC3	C47	L/3
Skywarrior		A3*	L/4
Super DC3	DC3S	C117	L/3
Super DC8 30/40/50	H/DC8		H/5
Super DC8 61/62/63	DC86		H/5
Voodoo		F101*	L/5
YC15		YC15	L/3
Messerschmitt (West Germany)			
Monson	ME29		S/2
Mitsubishi (Japan)			
Marquise/Solitaire	MU2		S/2
Diamond 1	MU3		L/3
Mooney Aircraft Co. (USA)			
Mark 10	MO10		S/2
Mark 20	MO20		S/2
Mark 21	MO21		S/2
Mark 22	MO22		S/2
Navion Aircraft Co. (USA)			
Range Master	NA1		S/2
Nihon Aeroplane Mfg. Co. (Japan)			
Model YS11	YS11		L/3
Noorduyn Norseman (Canada)			
Norseman MK (IV)	NY4		S/2
Norseman MK (V)	NY5		S/2
Nord Aviation (France)			
Martinet NC701/02		MART	L/3
Nortalas 25C1		NORD	L/3
Super Broussard-260/262	ND26		L/3
Transall C160	ND16		L/3
Northrop (USA)			
F18		F18*	L/5
Talon		T38*	S/5
Tiger/Freedom Fighter		F5*	L/5
Piaggio & Co. (Italy)			
Royal Gull	P136		S/2
Super Gull	P166		S/2
Vespa Jet	P808		L/3
Pilatus Aircraft (Switzerland)			
Pilatus Porter	PL6		S/1
Turbo Porter	PL6A		S/1
Piper Aircraft (USA)			
Aerostar 700 Series	PA60		S/2
Apache	PA23		S/2
Aztec	PAZT	U11	S/2
Brave	PA36		S/2
Cherokee	PA28		S/2
Cherokee Arrow (R)	PARO		S/2
Cherokee Six/ Lance/Saratoga	PA32		S/2
Cheyenne I/II	PAYE		S/3
Cheyenne III/IV	PA42		S/3

Manufacturer/Model	*Type Designator*		*Weight Class/ Group*
	Civil	*Military*	
Chieftan	PA31		S/2
Clipper	PA16		S/2
Commanche	PA24		S/2
Cruiser	PA5		S/2
Cub Special	PA11		S/2
Cub Trainer	PA2		S/2
Family Cruiser	PA14		S/2
Malibu	PA46		S/2
Mohave	PA31		S/2
Navajo	PA31		S/2
Pacer	PA20		S/2
Pawnee	PA25		S/2
Seminole	PA44		S/2
Seneca	PASE		S/2
Super Cruiser	PA12		S/2
Super Cub	PA18	U7	S/2
Tomahawk	PA38		S/2
Tri-Pacer/Colt Caribbean	PA22		S/2
Twin Comanche	PA30/39		S/2
Vagabond Trainer	PA15		S/2
Vagabond	PA17		S/2
Riley Aeronautics (USA)			
Model 65/Rocket	RY65		S/2
Turbo-Executive	RY40		S/2
Rockwell International (USA)			
Aero Commander 112	AC12		S/2
Aero Commander 685	AC85		S/2
Alt-Cruiser	AC72		S/3
Bronco		OV10*	L/3
Buckeye T-20		T2*	L/5
Commander 112A	AC2A		S/2
Commander 112TC	AC2T		S/2
Commander 114	AC14		S/2
Commander (200)	MY20		S/2
Commander (500)	AC50		S/2
Commander (520)	AC52		S/2
Commander (560)	AC56	U9	S/2
Darter (100/150)	AC10		S/2
Grand Commander (680FL)	AC60		S/2
Jet Commander	AC21		L/3
Lark	LARK		S/2
Mitchell		B25	L/3
Navion	N145		S/2
Sabre		F86*	L/5
Sabreliner	N265	T39	L/3
Super Commander (680S)	AC68	U4	S/2
Super Sabre		F100*	L/5
Texan	N6	T6	S/2
Trojan		T28	S/2
Turbo Commander	AC6T		S/2
Vigilante		A5*	L/5
Scottish Aviation (U.K.)			
Pioneer	SCP		S/2
Twin Pioneer	SCPT		S/2
Short (U.K.)			
Belfast	SH5	SC5	L/5
Short	SHD3		L/3
Skyvan	SH7		S/3
Silvaire (USA)			
Luscombe	SL8		S/2
Stinson (USA)			
Reliant (Vultee)	ST77		S/2
Voyager/Station Wagon (105/108)	ST75		S/2
Sud Aviation (France)			
Caravella	S210		L/4
Swearingen Aviation (USA)			
Merlin IIA	SW2		S/3
Merlin IIB	SW3		S/3
Merlin IV/Metro	SW4		S/3
Taylorcraft (USA)			
Sportsman 19	TC19		S/2
Topper 20A	TC20		S/2
Tourist 15A	TC15		S/2
VFW-Fokker (West Germany)			
FH227	FK22		L/3
Friendship	FK27		L/3
Fellowship	FK28		L/4
VFW 614	VF14		L/3
Vought (USA)			
Corsair II		A7*	L/5
Crusader		F8*	L/5
Swift	TE1		S/2

HELICOPTERS

Manufacturer/Model	*Civil*	*Military*	*Weight Class/ Group*
Aerospatiale (France)			
Lama	HR15		S/1
Alouette II	HR30		S/1
Aloutte III	HR60		S/1
Dauphin	HR36		S/1
Ecurevil/Astar	HR35		S/1
Gazelle	HR34		S/1
Puma	HR33		L/2
Super Frelon	HR32		L/2
Bell Helicopter (Textron) (USA)			
Biglifter	BH14		L/2
Cobra	BH09	AH1	S/1

Manufacturer/Model	Type Designator Civil	Type Designator Military	Weight Class/ Group
Jet Ranger/Long Ranger/Sea Ranger/Kiowa	BH06	H58/57	S/1
Iroquois	BH04	UH-1H	S/1
Model 205 A-1	BH05		S/1
Sea Cobra		AH-1T	L/2
Sioux	BH13	H13	S/1
Twin Huey	BHTH	UH-1N	S/1
Boeing Vertol Co. (USA)			
Chinook	HV47	CH47	L/2
Model 105	B105		S/1
Sea Knight	HV07	CH46	L/2
Brantley-Hynes Helicopter, Inc. (USA)			
Model B-2A/B-2B	HB42		S/1
Model 305	HB43		S/1
Breda Nardi Costruzioni (Italy)			
Model 269C	NH30		S/1
Model 369D	NH50		S/1
Costruzioni Aeronautiche, Agusta (Italy)			
Model 4JT-3B1	A4JT		S/1
Model A109	A109		S/1
Model 212 ASW	A212		S/1
Enstrom Corp. (USA)			
Executive	HF28		S/1
Shark	HF80		S/1
Turbo-Shark	HF8C		S/1
Fairchild/Republic (USA)			
L3/SL3	HH3		S/1
L4/SL4	HH4		S/1
Raven	HH12	H23	S/1
Hughes Helicopters Div. of Summa Corp. (USA)			
AAH	HU64	YAH64	L/2
Model 269/300	HU30		S/1
Osage		H55	S/1
Pawnee 369/500	HU50	H6	S/1
Kaman Aircraft Corp. (USA)			
Huskie 600-3/5	HK60	H43	L/2
Seasprite		H2	L/2
Kawasaki Heavy Industries Ltd. (Japan)			
Model BK-117	HK17		S/1
Messerschmitt-Boelkow-Blohm (West Germany)			
Model BO 105	HM05		S/1
Model BK 117 (Kawasaki)	HK17		S/1
Panstwowe Zaklady Lotnicze (Poland)			
Model SM-1W/2	HZ1		S/1
Model Mi-2/2M	HZ2		S/1
Robinson Helicopter, Inc. (USA)			
Model R22	HR22		S/1
Sikorsky Aircraft (USA)			
Black Hawk S-70	SK70	H60	L/2
Chickasaw S-55	SK55	H19	S/1
Choctaw S-58 Seashore/Seaboat	SK58	H34	L/2
Lamps MK3		SH60	L/2
Model S-51	SK51		L/2
Model S-52	SK52		L/2
Model S-59	SK59		L/2
Model S-62	SK62	H52	S/1
Model S-69	SK69	H59	S/1
Model S-76	SK76		S/1
Mojave S-56	SK56	H37	L/2
RSRA S-72	SK72		L/2
Sea King S-61	SK61	H3	L/2
Sea Stallion S-65	SK65	H53	L/2
Skycrane S-64 E/F	SK64		L/2
Tarhe S-64		H54	L/2
Silvercraft (Italy)			
Model SH-4	HS4		S/1

NOTE: The weight class listings in this appendix are to be used for wake turbulence separation purposes only. The aircraft groups are general.

* Indicates single-piloted military turbojet aircraft.

** DeHavilland Dash 7 authorized 2,000 feet with letter of agreement and 7½° glide slope.

When the weight class cannot be determined from this appendix, obtain aircraft gross weight from pilot and use the appropriate weight class designator.

Groups are based on FAA-certificated stopping distance and/or manufacturer's published performance data.

Appendix C

STANDARD OPERATING PRACTICE (SOP) FOR TRANSFER OF RADAR IDENTIFICATION AND ASSOCIATED COORDINATION

1. PURPOSE

This appendix defines the terms and functions used in coordination associated with the transfer of radar identification, and prescribes a structured step-by-step process to be used as a norm when transferring radar identification from one controller to another. The specific step-by-step process is contained with explanatory notes.

2. BACKGROUND

In the past, the contents, methods, and practices used in coordination associated with conducting a transfer of radar identification varied among personnel. Pertinent information was often not exchanged or not completely understood. The confusion often created unnecessary increases in workload and decreases in operational efficiency. The major causes of confusion were the unrecognized differences in the meanings of terms and the inconsistency in requests and acknowledgments during coordination. The definitions and structured processes contained in this SOP have been established to enhance operational effectiveness and to facilitate the exchange of information when transferring radar identification.

The information contained in this appendix was initially developed by active air traffic controllers and first-line supervisors. The product generated by these workgroups was taken into the field and tested in a live traffic environment. Additionally, changes and recommendations from controllers at the test sites were compiled and, where warranted, incorporated into the SOP. This appendix DOES NOT in any way attempt to take flexibility or controller judgement away from the air traffic controller. The controller must still decide which action is applicable and which option to take in response to each action. The appendix only says that after controllers decide which action to initiate, they shall follow the guidelines and step-by-step processed as outlined.

3. GENERAL

a. *HANDOFF.* The SOP for the handoff action prescribes nothing essentially new although the specific step-by-step process may be new to some controllers.

The SOP allows for the action to begin as an intended handoff. The receiving controller has the options of accepting the handoff, accepting with restrictions, or denying the handoff by saying "unable." In the case of denial, time permitting, the receiving controller should state the reasons for denial. Should it be necessary to reinitiate the action later, the initiating controller should repeat the step-by-step process from the beginning.

b. *POINT OUT.* The radar point out function was incorporated into the system as a means of reducing frequency changes and expediting traffic. This function permits one controller to transfer the radar identification of an aircraft to another controller, request approval for an aircraft to enter the other controller's airspace, and retain radio contact with the aircraft. It was designed for use only when an aircraft would be in another controller's airspace for a short period of time. The present SOP was established to clarify and standardize the meaning and usage of "point out" and to document the related step-by-step process of controller-to-controller actions and communications. The term "point out" in the SOP refers to the case when the aircraft will or may enter another controller's airspace for a short period of time. The controller who initiates the point out is requesting approval to (1) enter the other controller's airspace, and (2) retain radio contact with the aircraft.

The point out action in this SOP is to be used only when it is opperationally acceptable and an expeditious alternative to the handoff action. Therefore, point out is prescribed to cover exceptions to a controller's usual actions. If points outs occur frequently in a particular part of a controller's airspace, the airspace configuration, or the procedure, or both may need to be examined and modified to reduce or eliminate the need for point out instead of handoff. If examination indicates point out actions are preferable to handoff actions, then a special procedure and written agreement may be needed.

Point out is not to be used as an alternative to handoff when the receiving controller considers a handoff to be preferred. The step-by-step process allows the receiving controller to approve the point out as coordinated, approve with restrictions, convert the point out to a handoff, or report that he is unable to accomodate at all by saying "unable." If unable, time permitting, the receiving controller should state the reason. Should it be necessary to reinitiate the action later, the intiating controller should repeat the step-by-step process from the beginning.

The point out is the initiating controller's request for the two controllers to agree on what is to be done. A point out shall always be accomplished by voice coordination. The receiving controller shall withhold the term "point out approved" until the coordination is completed.

The receiving controller is discouraged from answering a point out with lengthy or cumbersome restrictions. If the receiving controller issues lengthy or cumbersome restrictions, the required coordination is likely to be more time consuming and less desirable than a handoff.

The two controllers involved are required to make this judgement in each case. They should remember that point out is an exception to the routine handoff action and is prescribed only when it is operationally advantageous.

c. *TRAFFIC.* It is common practice to transfer radar identification of an aircraft by issuing traffic in conjunction with a handoff or point out.

The issuance of traffic with appropriate restrictions requires voice coordination in order to ensure separation of the aircraft involved. The required coordination is likely to be more time consuming and less desirable than issuing other restrictions. The issuance of "traffic" with appropriate restrictions instead of issuing other restrictions should only be used when it will provide an operational advantage. The controllers involved are required to make this judgment in each case. It must be emphasized that when using the term "traffic" for coordinating separation, the controller issuing traffic shall issue appropriate restrictions. Because "traffic" restrictions are issued with respect to an aircraft rather than a point in space, the controller accepting the restrictions shall be responsible for ensuring that approved separation is maintained between the involved aircraft. Specific examples and details of "traffic" restrictions are presented in Note 11, located at the end of this SOP.

4. STEP-BY-STEP PROCESS

a. The following pages contain the step-by-step process for carrying out the actions described in this Appendix.

b. To make the step-by-step process more understandable and easier to read, the following points are explained:

(1) Some steps contain footnotes in parenthesis; e.g., (2), (3), etc., that refer to notes which explain the action taken in that step. (These notes are found in the back of this Appendix.)

(2) Aircraft position is the distance and bearing of the aircraft from a fix, map symbol, or radar target known and displayed by both the receiving and transferring controllers.

(3) Aircraft identification refers to any accepted method for labeling the aircraft; e.g., aircraft identification or beacon code.

(4) Altitude information should include whether the aircraft is climbing or descending, the assigned altitude, and any altitude restrictions. Altitude information may be omitted when letters of agreement or facility directives ensure that the altitude information will be known by the receiving controller.

c. *HANDOFF (physical).*

Initiating Controller—	*Receiving Controller—*
(1) Move to appropriate position and manually point to the aircraft's location on the receiving controller's scope.	
(2) Wait for indication that the receiving controller is ready.	
	(3) Indicate when ready.
(4) Say, "Handoff," state aircraft identification and altitude information. (Communicate other pertinent information at this time.)(1)	
	(5) Look for target and establish radar identification.

Initiating Controller—

Receiving Controller—

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, than all "(c)" parts, etc. Example: Read (6)(a), (7)(a), (8)(a), etc.: then (6)(b), (7)(b), (8)(b), etc.

(6)(a) State aircraft identification. Say, "Radar Contact" and, if appropriate, take action to label target. (2)(3)

(b) State aircraft identification and state restrictions. Say, "Radar Contact" and if appropriate, take action to label target. (2)(3)(11a)

(c) State aircraft identification. Say, "Unable." (9a)

(7)(a) Cease pointing.

(b) Cease pointing. (4)

(c) Cease pointing.

BOTH CONTROLLERS MARK STRIPS OR MAKE THEIR NOTES, AS REQUIRED, AT THE END OF EACH PROCESS. (5)

d. *HANDOFF (interphone).*

Initiating Controller—

Receiving Controller—

(1) Make interphone connection to receive controller's position.

(2) Listen to ensure that the interphone circuit is not in use and that the receiving controller is not delivering or receiving a voice message.

(3) State intended receiving controller's position identification, initiating controller's position identification, and line number if required. Say "Handoff."

(4) State receiving controller's position identification. (6)

(SEE NOTE (10) FOR ALTERNATE CALL-UP PROCESS)

(5) State aircraft position, identification, and altitude information. (Communicate other pertinent information at this time.) (1)

(6) Look for target and establish radar identification.

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, then all "(c)" parts, etc. Example: Read (7)(a), (8)(a), (9)(a), etc.; then (7)(b), (8)(b), (9)(b), etc.

(7)(a) Read back aircraft identification. Say, "Radar Contact," state operating initials, and, if appropriate, take action to label target. (2)(3)

(b) Read back aircraft identification, state restrictions. Say, "Radar Contact," state operating initials, and if appropriate, take action to label target. (2)(3)(11a)

(c) Read back aircraft identification. Say, "Unable," and state operating initials. (9a)

Initiating Controller—	*Receiving Controller—*
(8)(a) State operating initials and release the line. (b) State operating initials and release the line. (4) (c) State operating initials and release the line.	

BOTH CONTROLLERS MARK STRIPS OR TAKE OTHER NOTES, AS REQUIRED, AT THE END OF EACH PROCESS. (5)

e. *HANDOFF (automated).*

Initiating Controller—	*Receiving Controller—*
(1) Take action to place the data block on receiving controller's display. (7) (Ensure that the data block is associated with the appropriate target.)	

This action is not required where directives permit computer-generated handoff.

For ease of reading the following steps, read all parts "(a)" as one integrated process, then read all "(b)" as parts another process, then all "(c)" parts, etc. Example: Read (2)(a), (3)(a), (4)(a), etc.; then (2)(b), (3)(b), (4)(b), etc. "No action prescribed" means the process ended with the preceding step.

Initiating Controller—	*Receiving Controller—*
	(2) When data block is observed: (a) Take action to accept handoff. (b) To place restrictions, make interphone connection to initiating controller's position, listen to insure that the interphone circuit is not in use and that the initiating controller is not delivering or receiving a voice message, state initiating controller's position identification, receiving controller's position identication, and line number if required. (10)(11a) (c) If unable, follow interphone steps in (2)(b) above.
(3)(a) No action prescribed. (b) State initiating controller's position identification. (6)(10) (c) State initiating controller's position identification. (6)(10)	
	(4)(b) State aircraft identification and state restrictions. (c) State aircraft identification. Say, "Unable," and state operating initials. (9a)
5)(b) State operating initials and release the line. (4) (c) State operating initials and release the line.	
	(6)(b) State operating initials, release the line, and take action to accept handoff. (c) Release the line.

BOTH CONTROLLERS MARK STRIPS OR MAKE OTHER NOTES, AS REQUIRED, AT THE END OF EACH PROCESS (5)

f. *POINT OUT (physical).*

Initiating Controller—

(1) Move to appropriate position and manually point to the aircraft's location on the receiving controller's scope.

(2) Wait for indication that the receiving controller is ready.

Receiving Controller—

(3) Indicate when ready. I03(4) Say "Point Out," state aircraft identification, altitude, and route information. (Communicate other pertinent information at this time.)(1)

(5) Look for target and establish radar identification.

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, then all "(c)" parts, etc. Example: Read (6)(a), (7)(a), (8)(a), etc.; then (6)(b), (7)(b), (8)(b), etc.

(6)(a) State aircraft identification. Say, "Point Out Approved," and if appropriate, take action to label target. (2)(3)

(b) State aircraft identification and state restrictions. Say, "Point Out Approved," and if appropriate, take action to label target. (2)(3)(11a)

(c) State aircraft identification. Say, "Handoff, Radar Contact," and if appropriate, take action to label target. (2)(3)

(d) Read back aircraft identification. Say, "Unable." (9a)

(7)(a) Cease pointing.

(b) Cease pointing.

(c) Cease pointing.

(d) Cease pointing.

BOTH CONTROLLERS MARK STRIPS OR MAKE OTHER NOTES, AS REQUIRED. (5)

g. *POINT OUT (interphone)*

Initiating Controller—

(1) Make interphone connection to receiving controller's position.

(2) Listen to ensure that the interphone circuit is not in use and that the receiving controller is not delivering or receiving a voice message.

(3) State intended receiving controller's position identification, initiating controller's position identification, and line number, if required. Say, "Point Out."

Receiving Controller—

(4) State receiving controller's position identification. (6)

Initiating Controller— *Receiving Controller—*

(SEE NOTE (10) FOR ALTERNATE CALL-UP PROCESS)

(5) State aircraft position, identification, altitude and route information. (Communicate other pertinent information at this time.) (1)

(6) Look for target, and establish radar identification.

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, then all "(c)" parts, etc. Example: Read (7)(a), (8)(a), (9)(a), etc.; then (7)(b), (8)(b), (9)(b), etc.

(7)(a) Read back aircraft identification. Say, "Point Out Approved," and state operating initials. If appropriate, take action to label target. (2)(3)

(b) Read back aircraft identification, and state restrictions. Say, "Point Out Approved," and if appropriate, take action to label target. (2)(3)(11a)

(c) Read back aircraft identification. Say, "Handoff, Radar Contact," state operating initials, and label target. (2)(3)

(d) Read back aircraft identification. Say, "Unable," and state operating initials. (9a)

(8)(a) State operating initials and release the line.

(b) State operating initials and release the line. (4)

(c) State operating initials and release the line.

(d) State operating initials and release the line.

BOTH CONTROLLERS MARK STRIPS OR MAKE OTHER NOTES, AS REQUIRED. (5)

h. *POINT OUT (automated).*

Initiating Controller— *Receiving Controller—*

(1) Take action to place the data block on receiving controller's display. (Ensure that the data block is associated with the appropriate target.) (7)

(2) Make interphone connection to receiving controller's position.

(3) Listen to ensure that the interphone circuit is not in use and that the receiving controller is not delivering a voice message.

(4) State intended receiving controller's position identification, and line number if required. Say, "Point Out."

(5) State receiving controller's position identification. (6)

Initiating Controller— *Receiving Controller—*

(SEE NOTE (10) FOR ALTERNATE CALL-UP PROCESS)

(6) State aircraft position, identification, altitude, and route information. (Communicate other pertinent information at this time.) (1)

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, then all "(c)" parts, etc. Example: Read (7)(a), (8)(a), (9)(a), etc.; then (7)(b), (8)(b), (9)(b), etc.

(7)(a) When data block is observed, read back aircraft identification. Say, "Point Out Approved," state operating initials. (2)

(b) Read back aircraft identification and state restrictions. Say, "Point Out Approved," state operating initials. (2)(11a)

(c) Read back aircraft identification. Say, "Handoff, Radar Contact," and operating initials. (2)

(d) Read back aircraft identification. Say, "Unable," and state operating initials. (9a)

(8)(a) State operating initials and release the line.

(b) State operating initials and release the line. (4)

(c) State operating initials, release the line, and where appropriate, take action to place handoff on receiving controller's display. (7)(8)

(d) State operating initials, and release the line. (9)

BOTH CONTROLLERS MARK STRIPS OR MAKE NOTES, AS REQUIRED, AT THE END OF EACH PROCESS. (5)

l. *FOOTNOTES.*

(1) This "other pertinent information" for handoff and point out includes that listed in Chapter 5, Section 4, paragraph 5-64f.

(2) The term "Radar Contact" is prescribed exclusively for handoff; "Point Out Approved" is used exclusively with point out; and "Traffic Observed" is used exclusively with the issuance of traffic with appropriate restrictions.

(3) The phrase "label the target" refers to any action which displays the status of the target. For example, marking a shrimp boat, displaying a full data block, or making a computer entry to change the data block are considered as "labeling the target."

(4) It is a common practice to issue restrictions to ensure separation. It is extremely important that these restrictions are clearly understood.

The controller receiving the restriction should either read it back or ask that it be repeated whenever there is any chance of misunderstanding. Should restrictions become too lengthy or cumbersome, an alternative course of action should be used. The controller receiving any coordinated restriction is responsible for complying with those restrictions.

(5) The prescribed time for marking strips or taking notes is that point in the process when it is known which marks should be made; not earlier, to avoid canceling and remaking the mark; not later, to avoid forgetting to make the mark.

(6) If the controller's stated position identification is not that of the intended controller, then the controller initiating the call says, "Disregard," releases the line, and starts the process over.

(7) The action applies only when the automated capability is available.

(8) If the receiving controller looks at the designated target location and sees no handoff or point out display, he says, "No display." The initi-

ating controller says, "Standby," and corrects the action to send the display to the intended receiving controller, who is holding on the line.

(9)(a) When the receiving controller responds to a handoff or a point out by saying "unable," he means he is unable to accept the handoff or the point out for some reason. When this occurs, he should, if time permits, state the reason; i.e., "radar failure," or "frequency failure," or "traffic," etc.

(b) When the controller receiving the appropriate traffic restrictions states "unable," he means he is unable to comply with the restrictions. Normally, alternate instructions should be issued at this time.

(10) The step-by-step process described in this appendix shows the sequence for initial call up when using a voice page line. In facilities where the 300 system communication equipment operates differently or various types of equipment are used, such as dial lines, ziptones, etc., it is permissible for the sequence to be changed after line connection is made. The change shall be made at the facility level in a facility directive.

Example: The receiving controller, when detecting the override alert (click, ziptone, etc.), shall answer the initiating controller, when ready, by stating sector I.D.

Regardless of the sequence chosen by a facility, the following items are required for all interphone contacts:

(a) Both controllers state position identification.

(b) Conduct coordination and response in accordance with this handbook and appendix.

(c) Both controllers terminate interphone contact with operating initials.

(11) The traffic action is established to clarify and standardize a condition that occurs in the system and has been referred to as many different things. This action is a exception to the routine and in many facilities may not be needed or used at all.

Following are examples where issuing traffic with appropriate restrictions is being used in the system:

(a) Traffic in response to a handoff or point out—

Controller A calls Controller B with handoff or point out. Controller B elects to respond by issuing traffic with appropriate restrictions and accepts the handoff or approves the point out.

Phraseology:

Controller B: TRAFFIC, (aircraft position), (aircraft identification), (altitude information), (appropriate restrictions; e.g., turn in reference to ....).

Controller A: TRAFFIC OBSERVED.

or

UNABLE (see Note 9(a)(b)), (operating initials).

Controller B: RADAR CONTACT

or

POINT OUT APPROVED, (operating initials).

The above process is to be inserted into the step-by-step for handoff or point out in the step where the receiving controller states restrictions.

(b) Initiating traffic in anticipation of a handoff or point out—

A slow aircraft overflying approach control airspace may require the departure controller to have departures level off underneath. However, in anticipation of the departure handoff, the center controller initiates a call to the approach control, transfers the radar identification by issuing traffic, and gives appropriate restrictions for the departures to continue climb in reference to the traffic.

Phraseology:

Initiating Controller: TRAFFIC, (aircraft position), (aircraft identification), (altitude information), (appropriate restrictions; e.g., climb reference....).

Receiving Controller: TRAFFIC OBSERVED

or

UNABLE (see Note 9(a)(b)), (operating initials).

Initiating Controller: (operating initials).

(c) In conjunction with a request for control release of an aircraft—

Controller A gives Controller B an early handoff on AA10 and transfers radio communications. Subsequently, Controller B requests control of AA10 while the aircraft is still in Controller A's airspace. Controller A relinquishes control of AA10 by issuing appropriate "traffic" restrictions.

Phraseology:

Controller A: TRAFFIC, (aircraft position), (aircraft identification), (aircraft altitude information), (appropriate restrictions; e.g., your control to descend reference....).

Controller B: TRAFFIC OBSERVED.

or

UNABLE (see Note (9)(b)), (operating initials).

Controller A: (operating initials).

Take action to label the target or to display the data block on the appropriate controller's display.

(d) In order to clarify the meaning of phraseology often used to issue restrictions in conjunction with "traffic," the following phrases are explained:

(i) "In reference to..." or "Your control" stated alone without stating the terms "climb," "descend," or "turn" means that no restrictions are intended; i.e., "anything you want to do with that aircraft is approved within my airspace." If any restrictions are intended, you must specifically state the restrictions.

(ii) "Climb in reference to..." or "Your control to climb" means that approval is granted for climb only; descents and turns are not approved.

(iii) "Descend in reference to ..." or "Your control to descend" means that approval is granted for descent only; climbs and turns are not approved.

(iv) "Turn in reference to ..." or "Your control to turn" means that approval is granted for turns (heading changes) only; climbs and descents are not approved.

(v) For brevity in all of the above, the phrase "in reference to" may be shortened to "reference" or "respect."

[illegible]

use words like "the following" or some similar phrase.

[illegible] with the restriction.

[illegible]

APPENDIX D

STANDARD OPERATING PRACTICE (SOP) FOR THE TRANSFER OF POSITION RESPONSIBILITY

1. PURPOSE

This appendix prescribes the method and step-by-step process for conducting a position relief briefing and transferring position responsibility from one specialist to another.

2. DISCUSSION

In all operational facilities, the increase in traffic density and the need for the expeditious movement of traffic without compromising safety have emphasized the importance of the position relief process. The contents, methods, and practices used for position relief and briefings vary among personnel, and pertinent information is often forgotten or incompletely covered. Major problems occur whenever there is a heavy reliance upon memory, unsupported by routines or systematic reminders. This SOP addresses the complete task of transferring position responsibility and the associated relief briefing.

Position relief unavoidably provides workload for specialists at the time of relief. The intent of this SOP is to make the transfer of position responsibility take place smoothly and to ensure a complete transfer of information with a minimum amount of workload. The method takes advantage of a self-briefing concept in which the relieving specialist obtains needed status information by reading from the Status Information Area/s to begin the relief process. Up to the moment information related to the control of aircraft or vehicular movements requires verbal exchanges between specialists during the relief process. The method also specifies the moment when the transfer of position responsibility occurs.

In the final part of the relief process, the specialist being relieved monitors and reviews the position to ensure that nothing has been overlooked or incorrectly displayed and that the transfer of position responsibility occurred with a complete briefing.

3. TERMS

The following terms are important for a complete understanding of this SOP:

a. Status Information Area (SIA). Manual or automatic displays of the current status of position related equipment and operational conditions or procedures.

b. Written Notes. Manually recorded items of information kept at designated locations on the position of operation. They may be an element of the Status Information Area/s.

c. Checklist. An ordered listing of items to be covered during a position relief.

4. PRECAUTIONS

a. Specialists involved in the position relief process should not rush or be influenced to rush.

b. During position operation, each item of status information which is or may be an operational factor for the relieving specialist should be recorded as soon as it is operationally feasible so that it will not be forgotten or incorrectly recorded.

c. Extra care should be taken when more than one specialist relieves or is being relieved from a position at the same time; e.g., combining or decombining positions. Such simultaneous reliefs should be approached with caution.

5. RESPONSIBILITIES

a. The specialist being relieved shall be responsible for ensuring that any pertinent status information of which he/she is aware is relayed to the relieving specialist and is either:

(1) Accurately displayed in the Status Information Area/s for which he/she has responsibility, or

(2) Relayed to the position having responsibility for accurately displaying the status information.

b. The relieving specialist shall be responsible for ensuring that, prior to accepting responsibility for the position, any unresolved questions pertaining to the operation of the position are resolved.

c. The relieving specialist and the specialist being relieved shall share equal responsibility for the completeness and accuracy of the position relief briefing.

5c Note. — The "sharing" of this responsibility means that the specialist being relieved is obligated to provide a complete, accurate briefing and the relieving specialist is obligated to ensure that a briefing takes place and is to his/her total satisfaction.

d. The specialists engaged in a position relief shall conduct the relief process at the position being relieved unless other procedures have been established and authorized by the facility air traffic manager.

6. STEP-BY-STEP PROCESS

Relieving Specialist	*Specialist Being Relieved*
a. PREVIEW THE POSITION	
(1) Follow checklist and review the Status Information Area/s. (Note.— This sub-step may be replaced by an authorized pre-position briefing provided an equivalent review of checklist items is accomplished.)	
(2) Observe position equipment, operational situation, and the work environment.	
(3) Listen to voice communications and observe other operational actions.	
(4) Observe current and pending aircraft and vehicular traffic and correlate with flight and other movement information.	
(5) Indicate to the specialist being relieved that the position has been previewed and that the verbal briefing may begin. Note.— Sub-steps (2), (3), and (4) may be conducted concurrently or in any order.	
b. VERBAL BRIEFING	
	(1) Brief the relieving specialist on the abnormal status of items not listed on the Status Information Area/s as well as on any items of special interest calling for verbal explanation or additional discussion.
	(2) Brief on traffic, if applicable.
(3) Ask questions necessary to ensure a complete understanding of the operational situation.	
	(4) Completely answer any questions asked.
c. ASSUMPTION OF POSITION RESPONSIBILITY	
(1) Make a statement or otherwise indicate to the specialist being relieved that position responsibility has been assumed.	
	(2) Release the position to the relieving specialist.
d. REVIEW THE POSITION	
(1) Sign-on the position unless a facility directive authorizes sub-step (8).	
(2) Check, verify, and update the information obtained in steps (a) and (b).	
(3) Check position equipment in accordance with existing directives.	

Relieving Specialist

Specialist Being Relieved

(4) Review checklist, Status Information Area/s, written notes, and other prescribed sources of information and advise the relieving specialist of known omissions, updates, or inaccuracies.

(5) Observe overall position operation to determine if assistance is needed.

(6) If assistance is needed, provide or summon it as appropriate.

(7) Advise the appropriate position regarding known Status Information Area/s omissions, updates, or inaccuracies.

(8) Sign-on the relieving specialist if appropriate.

(9) Sign off the position in accordance with existing directives or otherwise indicate that the relief process is complete.

[illegible]

[illegible]

[illegible]

INDEX

[References are to Paragraph numbers]

A

ABBREVIATED DEPARTURE [4-17] [4-22]
ABBREVIATED DEPARTURE CLEARANCE [4-17] [4-22]
Abbreviated IFR Flight Plans [Glossary]
Abeam [Glossary]
Abort [Glossary]
ACCIDENT [2-77] [8-22] [8-25] [9-6]
Acknowledge [Glossary]
Acrobatic Flight [Glossary]
Additional Services [Glossary]
ADJUSTED MINIMUM FLIGHT LEVEL [4-43] [5-103]
Administrator [Glossary]
ADVANCE DESCENT CLEARANCE [4-61]
ADVANCE INFORMATION [4-65] [4-72] [5-21] [8-10]
Advise Intentions [Glossary]
ADVISORY FREQUENCY [2-21] [4-87] [7-31] [7-79] [8-54] [8-83] [10-51]
Advisory Frequency [Glossary]
Advisory [Glossary]
Advisory Service [Glossary]
AERIAL REFUELING [5-25] [6-52] [8-29] [8-30] [8-31] [8-38]
Aerial Refueling/Inflight Refueling [Glossary]
Aerodrome [Glossary]
Aeronautical Beacon [Glossary]
Aeronautical Chart [Glossary]
Affirmative [Glossary]
AFTERBURNER [4-21]
AIR AMBULANCE FLIGHTS [2-4]
Air Carrier District Office/ACDO [Glossary]
AIR DEFENSE CODE [5-31]
Air Defense Emergency [Glossary]
Air Defense Identification Zone/ADIZ [Glossary]
Air Navigation Facility [Glossary]
Air Route Surveillance RADAR/ARSR [Glossary]
Air Route Traffic Control Center/ARTCC [Glossary]
Air Taxi [Glossary]
Air Traffic Clearance/ATC Clearance [Glossary]
Air Traffic Control Command Center/ATCCC [Glossary]
Air Traffic Control Service [Glossary]
Air Traffic Control Specialist/Controller [Glossary]
Air Traffic Control/ATC [Glossary]
Air Traffic [Glossary]
AIRCRAFT *see AIRCRAFT CATEGORY*
AIRCRAFT *see AIRCRAFT IDENTIFICATION*
AIRCRAFT *see AIRCRAFT POSITION PLOTS*
AIRCRAFT *see ASPEN AIRCRAFT*
AIRCRAFT *see DUTCH AIRCRAFT*
AIRCRAFT *see EXPERIMENTAL AIRCRAFT*
AIRCRAFT *see HEAVY AIRCRAFT*
AIRCRAFT *see OVERDUE AIRCRAFT*
Aircraft Approach Category [Glossary]
AIRCRAFT CATEGORY [2-2] [3-33] [3-84] [3-92] [3-106] [3-108] [3-110] [3-123] [3-151] [3-152] [4-85] [5-25] [5-113] [5-152] [7-92] [10-31] [10-34]
Aircraft Classes [Glossary]
Aircraft [Glossary]
AIRCRAFT IDENTIFICATION [2-21] [2-35] [2-37] [2-38] [2-52] [2-53] [2-56] [2-75] [2-76] [2-82] [2-86] [3-4] [3-9] [3-35] [4-10] [4-66] [4-71] [5-27] [5-52] [5-53] [5-55] [5-56] [5-60] [5-61] [5-62] [5-65] [5-70] [5-113] [5-133] [5-213] [5-30] [7-60] [8-11] [8-12] [8-26] [8-30] [8-36] [8-37] [8-41] [9-10] [9-24] [9-28] [9-50] [10-16] [10-31]
AIRCRAFT POSITION PLOTS [9-20]
Airman's Information Manual/AIM [Glossary]
AIRMET/Airman's Meteorological Information [Glossary]
Airport Advisory Area [Glossary]
Airport Advisory Service/AAS [Glossary]
AIRPORT CONDITIONS [2-9] [2-105] [3-1] [3-10] [3-30] [3-31] [3-32] [3-33] [3-34] [3-35] [3-92] [3-93] [3-129] [3-134] [3-142] [3-143] [3-152] [4-70] [5-131] [5-144] [6-60] [7-30] [7-31] [7-40] [7-45] [9-24] [9-29] [10-13]
Airport Elevation/Field Elevation [Glossary]
Airport [Glossary]
Airport Information Desk/AID [Glossary]
AIRPORT LIGHTING [3-32] [3-40] [3-41] [3-42] [3-43] [3-44] [3-45] [3-46] [3-47] [3-48] [3-49] [3-50] [3-51] [3-52] [3-53] [3-54] [3-55] [3-56] [9-41]
Airport Lighting [Glossary]
Airport Marking Aids [Glossary]
Airport Rotating Beacon [Glossary]
Airport Surface Detection Equipment/ASDE [Glossary]
Airport Surveillance RADAR/ASR [Glossary]
AIRPORT TRAFFIC AREA [2-16] [2-21] [2-85] [3-1] [3-4] [3-9] [3-11] [3-47] [3-84] [7-31] [7-32] [7-60] [9-6]
Airport Traffic Area [Glossary]
Airport Traffic Control Service [Glossary]
Airport/Facility Directory [Glossary]
AIRSPACE *see ATC ASSIGNED AIRSPACE*
AIRSPACE *see CANADIAN AIRSPACE PROCEDURES*
AIRSPACE *see UNCONTROLLED AIRSPACE*
Airspeed [Glossary]
Airstart [Glossary]
Airway Beacon [Glossary]
Airway/Federal Airway [Glossary]
Alert Notice/ALNOT [Glossary]
ALIGNMENT CHECK [5-2]
ALNOT [9-3] [9-18] [9-19] [9-21]
Alpha Numeric Display/Data Block [Glossary]
Alternate Airport [Glossary]
ALTIMETER SETTING [2-11] [2-84] [2-111] [3-100] [3-120] [4-10] [4-42] [4-43] [4-72] [5-37] [5-131] [7-3] [9-53] [10-4]
Altimeter Setting [Glossary]
ALTITUDE *see ALTITUDE AMENDMENT*
ALTITUDE *see ALTITUDE ASSIGNMENT*
ALTITUDE *see ALTITUDE COMPUTER ENTRY*
ALTITUDE *see ALTITUDE DEVIATION*
ALTITUDE *see ALTITUDE FILTERS*
ALTITUDE *see ALTITUDE FLIGHT DIRECTIONS*
ALTITUDE *see ALTITUDE INFORMATION*
ALTITUDE *see ALTITUDE RESERVATION*

INDEX—Continued

[References are to Paragraph numbers]

ALTITUDE *see ALTITUDE RESTRICTED LOW APPROACH*
ALTITUDE *see ALTITUDE VERIFICATION*
ALTITUDE *see ANTICIPATED ALTITUDE CHANGES*
ALTITUDE *see AUTOMATIC ALTITUDE REPORTING*
ALTITUDE *see HIGH ALTITUDE INSTRUMENT APPROACH PROCEDURE*
ALTITUDE *see INTERIM ALTITUDE*
ALTITUDE *see MINIMUM ALTITUDES*
ALTITUDE *see MINIMUM EN ROUTE ALTITUDES*
ALTITUDE *see SELECTED ALTITUDE LIMITS*
ALTITUDE *see SPECIFIED ALTITUDE*
ALTITUDE *see VFR ALTITUDE ASSIGNMENT*
ALTITUDE AMENDMENT [4-14] [5-91]
ALTITUDE ASSIGNMENT [2-35] [2-51] [4-10] [4-21] [4-40] [4-41] [4-42] [4-43] [4-44] [4-45] [4-46] [4-47] [4-80] [4-83] [4-90] [5-25] [5-33] [5-57] [5-90] [5-91] [5-123] [5-192] [5-226] [6-11] [6-51] [6-52] [7-43] [7-94] [8-3] [8-26] [8-29] [8-31] [8-33] [8-52] [10-5] [10-13]
ALTITUDE COMPUTER ENTRY [5-192]
ALTITUDE DEVIATION [8-33]
ALTITUDE FILTERS [5-37] [5-194] [5-225]
ALTITUDE FLIGHT DIRECTIONS [4-41] [7-21] [10-18]
Altitude [Glossary]
ALTITUDE INFORMATION [1-4] [1-20] [2-20] [2-21] [2-22] [2-35] [2-38] [2-40] [2-50] [2-52] [2-53] [2-57] [2-84] [2-102] [2-103] [3-83] [3-100] [3-103] [3-124] [3-128] [3-133] [3-134] [4-10] [4-21] [4-22] [4-45] [4-50] [4-60] [4-65] [4-66] [4-71] [4-89] [4-90] [5-8] [5-39] [5-51] [5-62] [5-64] [5-66] [5-123] [5-126] [5-150] [5-152] [5-154] [5-168] [5-182] [5-193] [5-212] [5-222] [5-224] [6-31] [6-50] [7-4] [7-31] [7-94] [7-96] [8-22] [8-30] [8-35] [8-50] [8-54] [8-70] [8-71] [8-83] [9-10] [9-24] [9-26] [9-27] [9-53] [9-54] [9-60] [10-5] [10-51]
Altitude Readout/Automatic Altitude Report [Glossary]
ALTITUDE RESERVATION [2-1] [2-35] [4-16] [4-22] [8-26] [8-31]
Altitude Reservation/ALTRV [Glossary]
ALTITUDE RESTRICTED LOW APPROACH [3-83] [3-103] [3-128]
Altitude Restriction [Glossary]
Altitude Restrictions Are Cancelled [Glossary]
ALTITUDE VERIFICATION [4-40] [4-41] [4-42] [4-43] [4-44] [4-45] [4-46] [4-47] [5-38] [6-50]
ALTRV [2-35] [2-37] [4-16] [4-22] [4-40] [5-25] [8-34] [8-37] [8-40]
ANTICIPATED ALTITUDE CHANGES [2-35] [4-46]
APPROACH *see ALTITUDE RESTRICTED LOW APPROACH*
APPROACH *see APPROACH CLEARANCE*
APPROACH *see APPROACH COURSE INTERCEPTION ANGLE*
APPROACH *see APPROACH FREQUENCY CHANGE*
APPROACH *see APPROACH INFORMATION*
APPROACH *see APPROACH MONITORING*
APPROACH *see APPROACH RADAR BEACON CHANGE*
APPROACH *see APPROACH SEQUENCE*
APPROACH *see ASR APPROACH*
APPROACH *see CHARTED VISUAL APPROACH*
APPROACH *see CIRCLING APPROACH*
APPROACH *see CONTACT APPROACH*
APPROACH *see DELEGATION OF APPROACH CONTROL*
APPROACH *see FINAL APPROACH*
APPROACH *see HIGH ALTITUDE INSTRUMENT APPROACH PROCEDURE*
APPROACH *see LOW APPROACH*
APPROACH *see MISSED APPROACH*
APPROACH *see NO-GYRO APPROACH*
APPROACH *see OPTION APPROACH*
APPROACH *see OVERHEAD APPROACH*
APPROACH *see PAR APPROACH*
APPROACH *see PARALLEL ILS APPROACH*
APPROACH *see PRACTICE APPROACH*
APPROACH *see PRECAUTIONARY APPROACH*
APPROACH *see RADAR APPROACH*
APPROACH *see RESTRICTED APPROACH*
APPROACH *see SIDE-STEP APPROACH*
APPROACH *see SIMULTANEOUS APPROACH*
APPROACH *see SINGLE FREQUENCY APPROACH*
APPROACH *see TIMED APPROACH*
APPROACH *see VISUAL APPROACH*
APPROACH CLEARANCE [4-45] [4-51] [4-67] [4-68] [4-70] [4-72] [4-80] [4-81] [4-82] [4-83] [4-84] [4-85] [4-86] [4-87] [4-88] [4-89] [4-90] [4-91] [5-100] [5-122] [5-123] [5-143] [6-61] [6-66] [7-30] [7-33] [7-35] [9-40] [9-54]
Approach Clearance [Glossary]
Approach Control Facility [Glossary]
Approach Control Service [Glossary]
APPROACH COURSE INTERCEPTION ANGLE [5-121]
APPROACH FREQUENCY CHANGE [4-62] [4-63]
Approach Gate [Glossary]
APPROACH INFORMATION [2-9] [2-111] [3-121] [4-45] [4-50] [4-52] [4-65] [4-71] [4-72] [4-89] [5-131] [5-136] [5-150] [5-163] [5-168] [5-182] [7-3] [9-54]
APPROACH MONITORING [5-180] [5-181] [5-182] [5-183]
APPROACH RADAR BEACON CHANGE [4-63]
APPROACH SEQUENCE [6-61] [6-62] [7-30] [7-73] [7-74] [7-75] [7-76] [7-78]
Approach Sequence [Glossary]
Approach Speed [Glossary]
Apron/Ramp [Glossary]
Arc [Glossary]
Area Navigation/RNAV [Glossary]
Army Aviation Flight Information Bulletin/USAFIB [Glossary]
Arresting System [Glossary]
ARRIVAL PROCEDURES [3-120] [3-121] [3-122] [3-123] [3-124] [3-125] [3-126] [3-127] [3-128] [3-129] [3-130] [3-131] [3-132] [3-133] [3-134] [4-60] [4-61] [4-62] [4-63] [4-64] [4-65] [4-66] [4-67] [4-68] [4-69] [4-70] [4-71] [4-72] [4-73] [7-40]
Arrival Time [Glossary]
ARSR [5-123]
ARTS [5-212] [7-77]
ASDE [3-7] [3-70] [3-72]
ASPEN AIRCRAFT [9-61]
ASR APPROACH [2-85] [5-3] [5-123] [5-131] [5-168] [5-169]
ATC Advises [Glossary]
ATC ASSIGNED AIRSPACE [1-4] [2-111] [8-40] [8-41] [8-42] [8-43]
ATC Assigned Airspace/ATCAA [Glossary]
ATC Clears [Glossary]
ATC Instruction [Glossary]
ATC Requests [Glossary]
ATIS [2-70] [3-34] [3-100] [3-120] [3-121] [4-52] [4-64] [4-65] [4-70] [4-72] [5-3] [5-125] [5-126] [5-131] [5-214] [7-3] [8-83] [10-4]

AUTHORIZED INTERRUPTIONS [2-72]
AUTHORIZED RELAYS [2-74]
AUTHORIZED TRANSMISSIONS [2-73]
Automated RADAR Terminal Systems/ARTS [Glossary]
AUTOMATIC ALTITUDE REPORTING [5-38] [5-39] [5-52]
Automatic Altitude Reporting [Glossary]
Automatic Carrier Landing System/ACLS [Glossary]
AUTOMATIC DATA TRANSFER [2-38]
Automatic Direction Finder/ADF [Glossary]
Automatic Terminal Information Service/ATIS [Glossary]
Autorotation [Glossary]
Aviation Weather Service [Glossary]

B

BEACON CODE [2-35] [2-36] [2-52] [2-53] [2-84] [3-102] [4-10] [5-20] [5-21] [5-22] [5-23] [5-24] [5-27] [5-29] [5-31] [5-33] [5-34] [5-38] [5-64] [5-65] [5-74] [5-78] [5-210] [5-216] [5-226] [5-30] [7-96] [8-3] [8-38]
BEACON CODE ASSIGNMENT [5-20] [5-25] [5-27] [5-29] [5-31]
BEACON RANGE ACCURACY [5-3] [5-4]
Bearing [Glossary]
Below Minimums [Glossary]
BIRD ACTIVITY [2-22]
Blast Fence [Glossary]
Blind Speed [Glossary]
Blind Spot/Blind Zone [Glossary]
BOMB THREAT [9-27]
BRAKING ACTION [2-102] [3-33] [3-34] [3-100] [3-120] [3-124]
Braking Action (Good, Fair, Poor, Nil) [Glossary]
Braking Action Advisories [Glossary]
BRAKING ACTION REPORT [3-33] [3-34]
BRITE [3-130] [4-71] [5-62] [7-77]
Broadcast [Glossary]

C

Call Up [Glossary]
CANADIAN ACC [2-42] [2-43]
CANADIAN AIRSPACE PROCEDURES [10-1] [10-2] [10-3] [10-4] [10-5] [10-6] [10-7] [10-8] [10-10] [10-11] [10-12] [10-13] [10-14] [10-15] [10-16] [10-17] [10-18] [10-30] [10-31] [10-32] [10-33] [10-34] [10-35] [10-36] [10-50] [10-51]
CANCEL TAKEOFF [3-112] [4-20]
Cardinal Altitudes or Flight Levels [Glossary]
CAUTIONARY ADVISORIES [2-20] [3-109] [3-123] [3-124] [7-10]
Ceiling [Glossary]
CELESTIAL NAVIGATION [2-35] [4-32] [8-21]
Celestial Navigation [Glossary]
CELESTIAL NAVIGATION TRAINING [2-35] [8-21]
Center Weather Advisory [Glossary]
Center's Area [Glossary]
CHAFF [1-4] [2-103] [5-5]
Chaff [Glossary]
CHARTED VISUAL APPROACH [7-34]
Charted Visual Flight Procedure (CVFP) Approach [Glossary]
Chase/Chase Aircraft [Glossary]
Circle To Land Maneuver/Circling Maneuver [Glossary]
Circle To Runway (Runway Numbered) [Glossary]
CIRCLING APPROACH [3-121] [4-67] [4-80] [4-85] [5-152] [5-182] [6-60] [7-49]
Clear Air Turbulence/CAT [Glossary]
CLEARANCE *see ABBREVIATED DEPARTURE CLEARANCE*
CLEARANCE *see ADVANCE DESCENT CLEARANCE*
CLEARANCE *see APPROACH CLEARANCE*
CLEARANCE *see CLEARANCE BEYOND FIX*
CLEARANCE *see CLEARANCE DELIVERY*
CLEARANCE *see CLEARANCE INFORMATION*
CLEARANCE *see CLEARANCE ITEMS*
CLEARANCE *see CLEARANCE LIMIT*
CLEARANCE *see CLEARANCE PREFIX*
CLEARANCE *see CLEARANCE READBACK*
CLEARANCE *see CLEARANCE RELAY*
CLEARANCE *see CLEARANCE VOID TIME*
CLEARANCE *see DEPARTURE CLEARANCE PROCEDURES*
CLEARANCE *see DESCENT CLEARANCE*
CLEARANCE *see FULL ROUTE CLEARANCE*
CLEARANCE BEYOND FIX [4-51]
CLEARANCE DELIVERY [2-85] [4-12] [7-96]
Clearance [Glossary]
CLEARANCE INFORMATION [2-50] [2-52] [4-11] [4-60] [10-4]
CLEARANCE ITEMS [4-10] [4-45]
CLEARANCE LIMIT [2-35] [2-53] [2-58] [3-71] [4-10] [4-21] [4-45] [4-50] [4-51] [4-53] [4-60] [4-66] [4-69] [4-72] [4-81] [8-35] [9-14] [10-6]
Clearance Limit [Glossary]
CLEARANCE PREFIX [4-11] [9-43]
CLEARANCE READBACK [4-21]
CLEARANCE RELAY [4-13] [4-21] [4-82]
Clearance Void If Not Off By (Time) [Glossary]
CLEARANCE VOID TIME [4-23] [9-14]
CLEARED AS FILED [4-22] [8-30]
Cleared As Filed [Glossary]
Cleared For (Type Of) Approach [Glossary]
Cleared For Approach [Glossary]
Cleared For Takeoff [Glossary]
Cleared For The Option [Glossary]
Cleared Through [Glossary]
Cleared To Land [Glossary]
Clearway [Glossary]
Climb To VFR [Glossary]
Climbout [Glossary]
CLOSED RUNWAY [1-20] [3-31] [3-127]
Closed Runway [Glossary]
CLOSED TRAFFIC [3-129]
Closed Traffic [Glossary]
Clutter [Glossary]
COAST TRACKS [5-196] [5-197]
Coastal Fix [Glossary]
Codes/Transponder Codes [Glossary]
Combined Center-RAPCON/CERAP [Glossary]
Common Route/Common Portion [Glossary]
COMMUNICATIONS FAILURE [2-41] [4-21] [4-44] [4-50] [4-51] [5-28] [5-110] [8-26] [9-43] [10-6]
COMMUNICATIONS TRANSFER [1-4] [2-16] [2-17] [4-60] [5-61] [5-64] [5-66] [5-167] [7-32]
Compass Locator [Glossary]
Compass Rose [Glossary]
Composite Flight Plan [Glossary]

Composite Route System [Glossary]
Composite Separation [Glossary]
Compulsory Reporting Points [Glossary]
COMPUTER MESSAGE VERIFICATION [2-38]
CONFIRM IDENTITY [5-53] [5-65]
CONFLICT ALERT [2-6] [5-190] [5-215]
Conflict Alert [Glossary]
CONSOLAN [Glossary]
CONTACT APPROACH [4-63] [4-80] [5-13] [7-35] [10-16]
Contact Approach [Glossary]
Contact [Glossary]
Conterminous U.S. [Glossary]
Continental United States [Glossary]
Control Sector [Glossary]
Control Slash [Glossary]
CONTROL TRANSFER [2-8] [2-15] [4-66] [4-71] [5-25] [5-39] [5-61] [7-32] [7-77] [8-21]
Controlled Airspace [Glossary]
Controller [Glossary]
CONTROLLER RESPONSIBILITY [1-1] [2-15] [3-3] [3-9] [3-124] [4-71] [4-90] [5-62] [5-125] [5-211] [5-221] [5-225]
Convective SIGMET/Convective Significant Meteorological Information [Glossary]
Coordinates [Glossary]
Coordination Fix [Glossary]
Correction [Glossary]
Course [Glossary]
Critical Engine [Glossary]
Cross (Fix) At (Altitude) [Glossary]
Cross (Fix) At Or Above (Altitude) [Glossary]
Cross (Fix) At Or Below (Altitude) [Glossary]
Crosswind Component [Glossary]
Crosswind [Glossary]
CRUISE [2-50] [4-16] [4-45] [6-52] [8-26] [8-70]
Cruise [Glossary]
Cruising Altitude/Level [Glossary]

D

DANGEROUS CARGO [8-20]
Decision Height/DH [Glossary]
Decoder [Glossary]
Defense Visual Flight Rules/DVFR [Glossary]
Delay Indefinite (Reason If Known) Expect Approach/Further Clearance (Time) [Glossary]
DELEGATION OF APPROACH CONTROL [5-124] [5-125]
DEPARTURE *see ABBREVIATED DEPARTURE*
DEPARTURE *see ABBREVIATED DEPARTURE CLEARANCE*
DEPARTURE *see DEPARTURE CLEARANCE PROCEDURES*
DEPARTURE *see DEPARTURE COORDINATION*
DEPARTURE *see DEPARTURE DELAY*
DEPARTURE *see DEPARTURE FREQUENCY*
DEPARTURE *see DEPARTURE INFORMATION*
DEPARTURE *see DEPARTURE SEPARATION*
DEPARTURE *see DEPARTURE VOID TIME*
DEPARTURE *see RADAR DEPARTURE*
DEPARTURE *see SAME COURSE DEPARTURE*
DEPARTURE *see SIMULTANEOUS DEPARTURE*
DEPARTURE *see SUCCESSIVE DEPARTURE*
DEPARTURE CLEARANCE PROCEDURES [4-17] [4-22]
Departure Control [Glossary]
DEPARTURE COORDINATION [2-38]
DEPARTURE DELAY [3-101] [4-25]
DEPARTURE FREQUENCY [2-17] [3-102] [8-35]
DEPARTURE INFORMATION [2-111] [3-100] [3-101] [4-25] [7-79] [7-96] [9-18]
DEPARTURE SEPARATION [3-100] [3-101] [3-102] [3-103] [3-104] [3-105] [3-106] [3-107] [3-108] [3-109] [3-110] [3-111] [3-112] [3-142] [3-151]
Departure Time [Glossary]
DEPARTURE VOID TIME [4-23] [9-14]
DERELICT BALLOON [8-71]
DESCENT CLEARANCE [4-45] [4-46] [4-61] [4-64] [4-70] [5-25] [5-101]
DEVIATION ADVISORIES [5-10]
Deviations [Glossary]
DF Approach Procedure [Glossary]
DF Fix [Glossary]
DF Guidance/DF Steer [Glossary]
DF SERVICE [9-50] [9-53]
Direct [Glossary]
Direction Finder/DF/UDF/VDF/UVDF [Glossary]
DISASTER [8-25] [9-6]
Discrete Code/Discrete Beacon Code [Glossary]
Discrete Frequency [Glossary]
Displaced Threshold [Glossary]
Distance Measuring Equipment/DME [Glossary]
Distress [Glossary]
DME [2-35] [2-57] [4-5] [4-30] [4-45] [4-53] [4-66] [5-51] [5-91] [5-169] [6-1] [6-10] [6-11] [6-31] [6-32] [6-33] [6-34] [6-41] [6-42] [10-10] [10-11] [10-13]
DME ARC MINIMA [6-42]
DME Fix [Glossary]
DME Separation [Glossary]
DOD FLIP [Glossary]
Drag Chute [Glossary]
DUTCH AIRCRAFT [9-61]
DUTY PRIORITY [2-2]
DVFR [2-33]

E

ECM [5-5] [8-37]
ELT [1-4] [9-3] [9-4] [9-10] [9-15] [9-16] [9-17] [9-26] [9-50]
EMERGENCY *see ELT*
EMERGENCY *see EMERGENCY ASSISTANCE*
EMERGENCY *see EMERGENCY LANDING*
EMERGENCY *see GROUND MISSILE EMERGENCY*
EMERGENCY ASSISTANCE [9-10] [9-11] [9-12] [9-13] [9-14] [9-15] [9-16] [9-17] [9-18] [9-19] [9-20] [9-21] [9-22] [9-23] [9-24] [9-25] [9-26] [9-27] [9-28] [9-29] [9-30] [9-31]
Emergency [Glossary]
EMERGENCY LANDING [7-35] [8-12] [9-62]
Emergency Locator Transmitter/ELT [Glossary]
En Route Air Traffic Control Services [Glossary]
En Route Automated RADAR Tracking System/EARTS [Glossary]
En Route Descent [Glossary]
En Route Flight Advisory Service/Flight Watch [Glossary]
En Route Minimum Safe Altitude Warning/E-MSAW [Glossary]
EQUIPMENT SUFFIX [2-57]

INDEX—Continued

[References are to Paragraph numbers]

Execute Missed Approach [Glossary]
Expect (Altitudes) At (Time) Or (Fix) [Glossary]
Expect Departure Clearance (Time)/EDCT [Glossary]
Expect Further Clearance (Time)/EFC [Glossary]
Expect Further Clearance Via (Airways, Routes, Or Fixes) [Glossary]
Expedite [Glossary]
EXPEDITIOUS COMPLIANCE [2-5] [3-90]
EXPERIMENTAL AIRCRAFT [8-23]
EXPLOSIVE CARGO [9-62]

F

FACILITY IDENTIFICATION [2-76] [2-85]
Fast File [Glossary]
Feathered Propeller [Glossary]
Feeder Route [Glossary]
Ferry Flight [Glossary]
Filed [Glossary]
FINAL APPROACH [2-6] [3-47] [3-103] [3-105] [3-133] [4-64] [4-80] [4-89] [5-6] [5-7] [5-91] [5-100] [5-114] [5-115] [5-120] [5-121] [5-122] [5-123] [5-124] [5-125] [5-126] [5-131] [5-132] [5-133] [5-134] [5-135] [5-136] [5-137] [5-139] [5-140] [5-141] [5-143] [5-144] [5-150] [5-152] [5-154] [5-164] [5-166] [5-180] [5-181] [5-182] [5-183] [5-217] [6-20] [6-60] [6-61] [6-63] [6-65] [9-54] [10-13]
Final Approach - IFR [Glossary]
Final Approach Course [Glossary]
Final Approach Fix/FAF [Glossary]
Final Approach Point [Glossary]
Final Controller [Glossary]
Final [Glossary]
Fix [Glossary]
FIX USE [2-92] [4-5] [4-32] [4-80]
Fixed-Wing Special IFR/FW/SIFR [Glossary]
Flag/Flag Alarm [Glossary]
Flameout [Glossary]
FLIGHT *see ADJUSTED MINIMUM FLIGHT LEVEL*
FLIGHT *see AIR AMBULANCE FLIGHTS*
FLIGHT *see ALTITUDE FLIGHT DIRECTIONS*
FLIGHT *see FLIGHT CHECK*
FLIGHT *see FLIGHT PLAN*
FLIGHT *see FLIGHT PLAN CANCELLATION*
FLIGHT *see FLIGHT PROGRESS STRIPS*
FLIGHT *see FORMATION FLIGHTS*
FLIGHT *see LIFEGUARD FLIGHTS*
FLIGHT *see MED EVAC FLIGHTS*
FLIGHT *see PRESSURE SUIT FLIGHTS*
FLIGHT *see RAC FLIGHTS*
FLIGHT CHECK [2-4] [2-54] [2-86] [4-1] [5-1] [8-1] [8-2] [9-3]
Flight Check [Glossary]
Flight Information Region/FIR [Glossary]
Flight Inspection/Flight Check [Glossary]
Flight Level [Glossary]
Flight Line [Glossary]
Flight Path [Glossary]
FLIGHT PLAN [2-4] [2-30] [2-31] [2-32] [2-33] [2-34] [2-35] [2-36] [2-37] [2-38] [2-39] [2-40] [2-41] [2-42] [2-43] [2-52] [2-56] [2-74] [2-77] [3-121] [4-16] [4-22] [4-27] [4-32] [4-34] [4-62] [4-80] [4-90] [5-13] [5-25] [5-29] [5-31] [5-39] [5-192] [5-197] [5-216] [5-226] [5-30] [7-2] [7-20] [7-35] [8-2] [8-3] [8-10] [8-11] [8-12] [8-20] [8-21] [8-22] [8-25] [8-26] [8-29] [8-30] [8-31] [8-33] [8-35] [9-3] [9-16] [9-17] [9-18] [9-24] [9-50] [10-6] [10-8]
FLIGHT PLAN CANCELLATION [2-4] [2-38] [2-52] [3-121] [4-62] [4-80] [4-90] [5-13] [5-29] [5-216] [5-226]
Flight Plan [Glossary]
FLIGHT PROGRESS STRIPS [2-30] [2-40] [2-50] [2-51] [2-52] [2-53] [2-54] [2-55] [2-56] [2-57] [2-58] [2-59] [3-4] [4-22] [5-11] [5-64] [8-70]
Flight Recorder [Glossary]
Flight Service Station/FSS [Glossary]
Flight Standards District Office/FSDO [Glossary]
Flight Test [Glossary]
Flight Watch [Glossary]
Flow Control [Glossary]
Fly Heading (Degrees) [Glossary]
FLYNET [2-4] [8-25]
Formation Flight [Glossary]
FORMATION FLIGHTS [2-13] [5-74] [8-29] [8-34]
Fuel Advisory Departure/FAD [Glossary]
FUEL DUMPING [8-50] [8-51] [8-52] [8-53] [8-54] [10-50] [10-51]
Fuel Dumping [Glossary]
Fuel Siphoning/Fuel Venting [Glossary]
FULL ROUTE CLEARANCE [4-22]

G

GATE HOLD [3-101]
GATE HOLD PROCEDURES [3-101]
Gate Hold Procedures [Glossary]
General Aviation District Office/GADO [Glossary]
General Aviation [Glossary]
GIANT LANCE [8-34]
Glide Path, (On/Above/Below) [Glossary]
Glide Slope Intercept Altitude [Glossary]
Glide Slope/GS [Glossary]
Go Ahead [Glossary]
Go Around [Glossary]
GO-AROUND [7-30] [7-31]
GPA [5-79]
Ground Clutter [Glossary]
Ground Controlled Approach/GCA [Glossary]
GROUND MISSILE EMERGENCY [9-70]
Ground Speed [Glossary]
GROUND VISIBILITY [7-35] [7-40] [7-46] [7-47] [10-16]

H

HANDOFF [2-35] [2-38] [2-82] [2-85] [4-26] [4-28] [4-63] [4-66] [5-21] [5-22] [5-23] [5-24] [5-25] [5-31] [5-37] [5-53] [5-60] [5-61] [5-62] [5-64] [5-65] [5-66] [5-135] [5-169] [5-210] [5-211] [5-212] [5-213] [9-22]
Handoff [Glossary]
Have Numbers [Glossary]
HEAVY AIRCRAFT [2-19] [2-20] [2-35] [2-52] [2-53] [3-34] [3-82] [3-106] [3-123] [3-128] [4-90] [5-125] [6-64] [7-33] [2-81]
Height Above Airport/HAA [Glossary]
Height Above Landing/HAL [Glossary]

Height Above Touchdown/HAT [Glossary]
HELICOPTER OPERATIONS [3-140] [3-141] [3-142] [3-143] [3-144] [3-145] [7-49]
Helicopter/Copter [Glossary]
Helipad [Glossary]
Heliport [Glossary]
Hertz/Hz [Glossary]
HIGH ALTITUDE INSTRUMENT APPROACH PROCEDURE [4-5] [4-64] [4-65] [4-83] [5-100]
High Frequency Communications/HF Communications [Glossary]
High Frequency/HF [Glossary]
High Speed Taxiway/Exit/Turnoff [Glossary]
HIJACK BEACON CODE [5-33] [9-22]
Hold/Holding Procedure [Glossary]
Holding Fix [Glossary]
HOLDING PATTERN [2-58] [4-5] [4-16] [4-50] [4-51] [4-53] [5-8] [5-9] [5-100] [5-217] [6-40] [6-42] [7-21]
Homing [Glossary]
Hover Check [Glossary]
Hover Taxi [Glossary]
How Do You Hear Me ? [Glossary]

I

I Say Again [Glossary]
Ident Feature [Glossary]
Ident [Glossary]
If Feasible, Reduce Speed To (Speed) [Glossary]
If No Transmission Received For (Time) [Glossary]
IFR Aircraft/IFR Flight [Glossary]
IFR Conditions [Glossary]
IFR Military Training Routes (IR) [Glossary]
IFR Takeoff Minimums And Departure Procedures [Glossary]
ILS Categories [Glossary]
ILS CRITICAL AREAS [3-84]
Immediately [Glossary]
Information Request/INREQ [Glossary]
Initial Approach Fix/IAF [Glossary]
Initial Approach Segment [Glossary]
Inner Marker/IM/Inner Marker Beacon [Glossary]
Instrument Approach Procedure/IAP/Instrument Approach [Glossary]
Instrument Flight Rules/IFR [Glossary]
Instrument Landing System/ILS [Glossary]
Instrument Meteorological Conditions/IMC [Glossary]
Instrument Runway [Glossary]
INTERIM ALTITUDE [4-21] [5-57] [5-192] [8-38]
Intermediate Approach Segment [Glossary]
Intermediate Fix/IF [Glossary]
International Airport [Glossary]
International Civil Aviation Organization/ICAO [Glossary]
International Flight Information Manual/IFIM [Glossary]
Interrogator [Glossary]
Intersecting Runways [Glossary]
Intersection Departure/Intersection Takeoff [Glossary]
Intersection [Glossary]
INTERSECTION TAKEOFF [3-4] [3-107] [3-108] [5-113]

J—K—L

Jamming [Glossary]
Jet Blast [Glossary]
Jet Route [Glossary]
Jet Stream [Glossary]
Jettisoning Of External Stores [Glossary]
Known Traffic [Glossary]
Landing Area [Glossary]
Landing Direction Indicator [Glossary]
Landing Minimums/IFR Landing Minimums [Glossary]
Landing Roll [Glossary]
Landing Sequence [Glossary]
Last Assigned Altitude [Glossary]
Lateral Separation [Glossary]
LIFEGUARD FLIGHTS [2-4]
Light Gun [Glossary]
Lighted Airport [Glossary]
Local Traffic [Glossary]
Localizer [Glossary]
Localizer Type Directional Aid/LDA [Glossary]
Localizer Usable Distance [Glossary]
Longitudinal Separation [Glossary]
LORAN/Long Range Navigation [Glossary]
Lost Communications/Two-Way Radio Communications Failure [Glossary]
Low Altitude Airway Structure/Federal Airways [Glossary]
LOW APPROACH [3-83] [3-103] [3-128] [4-91] [5-142]
Low Approach [Glossary]
Low Frequency/LF [Glossary]

M

Mach Number [Glossary]
Maintain [Glossary]
Make Short Approach [Glossary]
Mandatory Altitude [Glossary]
Marker Beacon [Glossary]
Maximum Authorized Altitude/MAA [Glossary]
Mayday [Glossary]
MED EVAC FLIGHTS [2-4]
MERGING TARGET [5-8]
Metering Fix [Glossary]
Metering [Glossary]
Microwave Landing System/MLS [Glossary]
Middle Compass Locator [Glossary]
Middle Marker/MM [Glossary]
Military Authority Assumes Responsibility For Separation Of Aircraft/MARSA [Glossary]
MILITARY OPERATIONS [1-9] [2-9] [2-11] [2-30] [2-32] [2-33] [2-86] [3-30] [4-22] [4-30] [4-32] [5-190] [8-27] [8-30] [8-31]
Military Training Routes/MTR [Glossary]
MINIMUM *see ADJUSTED MINIMUM FLIGHT LEVEL*
MINIMUM *see MINIMUM ALTITUDES*
MINIMUM *see MINIMUM EN ROUTE ALTITUDES*
MINIMUM ALTITUDES [2-84] [3-128] [4-30] [4-43] [4-44] [4-45] [4-80] [4-84] [4-90] [5-51] [5-57] [5-90] [5-112] [5-152] [5-153] [5-168] [5-191] [5-194] [5-216] [6-52] [6-66] [7-31] [7-35] [7-43] [7-94] [8-26] [9-24] [9-31] [9-50] [9-54] [10-1] [10-5] [10-6]
Minimum Crossing Altitude/MCA [Glossary]
Minimum Descent Altitude/MDA [Glossary]
MINIMUM EN ROUTE ALTITUDES [4-44] [5-112] [9-31]

INDEX—Continued

[References are to Paragraph numbers]

Minimum En Route IFR Altitude/MEA [Glossary]
Minimum Fuel [Glossary]
Minimum Holding Altitude/MHA [Glossary]
Minimum IFR Altitudes/MIA [Glossary]
Minimum Obstruction Clearance Altitude/MOCA [Glossary]
Minimum Reception Altitude/MRA [Glossary]
Minimum Safe Altitude Warning/MSAW [Glossary]
Minimum Safe Altitude/MSA [Glossary]
Minimum Vectoring Altitude/MVA [Glossary]
Minimums/Minima [Glossary]
MISSED APPROACH [3-84] [3-90] [3-121] [3-133] [4-63] [4-71] [4-80] [4-88] [4-89] [4-90] [5-90] [5-112] [5-113] [5-115] [5-125] [5-131] [5-141] [5-144] [5-154] [5-155] [5-168] [5-182] [6-60] [6-61] [6-66] [7-30] [7-31] [7-49] [9-54]
Missed Approach [Glossary]
Missed Approach Point/MAP [Glossary]
MITO [8-35]
Mode [Glossary]
Movement Area [Glossary]
Moving Target Indicator/MTI [Glossary]

N

NAS Stage A [Glossary]
National Airspace System/NAS [Glossary]
National Beacon Code Allocation Plan Airspace/NBCAP Airspace [Glossary]
National Flight Data Center/NFDC [Glossary]
National Flight Data Digest/NFDD [Glossary]
National Search And Rescue Plan [Glossary]
NAVAID Classes [Glossary]
Navigable Airspace [Glossary]
Navigational Aid/NAVAID [Glossary]
Negative Contact [Glossary]
Negative [Glossary]
Night [Glossary]
No Gyro Approach/Vector [Glossary]
NO-GYRO APPROACH [5-132]
Noncomposite Separation [Glossary]
Nondirectional Beacon/Radio Beacon/NDB [Glossary]
Nonprecision Approach Procedure/Nonprecision Approach [Glossary]
NonRADAR Approach Control [Glossary]
NonRADAR [Glossary]
NONRECEIPT OF POSITION REPORTS [6-2] [8-26]
NONTOWER AIRPORT [9-41]
North American Route [Glossary]
Notice To Airmen/NOTAM [Glossary]
Notices To Airmen Publication [Glossary]
Numerous Targets Vicinity (Location) [Glossary]

O

Obstacle [Glossary]
Obstruction [Glossary]
Obstruction Light [Glossary]
Off-route Vector [Glossary]
Offset Parallel Runways [Glossary]
On Course [Glossary]
On-Course Indication [Glossary]
OPTION APPROACH [3-90]
Option Approach [Glossary]
Organized Track System [Glossary]
Out [Glossary]
Outer Fix [Glossary]
Outer Marker/OM [Glossary]
Over [Glossary]
OVERDUE AIRCRAFT [3-121] [4-71] [9-3] [9-14]
OVERHEAD APPROACH [3-133] [4-91]
Overhead Approach/360 Overhead [Glossary]

P

PAN [Glossary]
PAR APPROACH [5-6] [5-132] [5-133] [5-135] [5-144] [5-160] [5-161] [5-163] [5-164] [5-165] [5-166] [5-167] [5-168] [5-169] [5-180] [5-181] [5-182] [5-183] [5-162]
PARACHUTE JUMPING [8-80] [8-81] [8-82] [8-83] [10-7]
PARALLEL ILS APPROACH [3-31] [5-125] [5-126]
Parallel ILS Approaches [Glossary]
Parallel Offset Route [Glossary]
Parallel Runways [Glossary]
PCA [5-3] [5-25]
Permanent Echo [Glossary]
Photo Reconnaissance/PR [Glossary]
Pilot Briefing/Pre-Flight Pilot Briefing [Glossary]
PILOT RESPONSIBILITY [2-20] [3-71] [3-123] [3-124] [3-125] [4-80] [5-100] [5-140] [5-166] [5-183] [8-26]
Pilot Weather Report/PIREP [Glossary]
Pilot-In-Command [Glossary]
Pilot's Discretion [Glossary]
Pilots Automatic Telephone Weather Answering Service/PATWAS [Glossary]
PIREP [2-102] [3-34] [5-120]
Position Report/Progress Report [Glossary]
POSITION REPORTING [2-35] [2-50] [3-120] [3-125] [4-5] [4-47] [5-12] [5-51] [5-197] [6-2] [6-3] [6-32] [8-3] [8-26] [8-70] [8-71] [9-16] [9-17] [9-20] [10-3] [10-11]
Position Symbol [Glossary]
Positive Control [Glossary]
PRACTICE APPROACH [3-11] [3-134] [4-90] [7-2] [9-53]
Practice Instrument Approach [Glossary]
PRECAUTIONARY APPROACH [3-134]
Precipitation [Glossary]
Precision Approach Procedure/Precision Approach [Glossary]
Precision Approach RADAR/PAR [Glossary]
Preferential Routes [Glossary]
Preferred IFR Routes [Glossary]
PRESSURE SUIT FLIGHTS [5-30] [8-31]
Procedure Turn Inbound [Glossary]
Procedure Turn/PT [Glossary]
Profile Descent [Glossary]
Programmable Indicator Data Processor/PIDP [Glossary]
Proposed Boundary Crossing Time/PBCT [Glossary]
Published Route [Glossary]

Q

Quadrant [Glossary]
Quick Look [Glossary]
Quota Flow Control [Glossary]

R

RAC FLIGHTS [8-22]
RADAR *see APPROACH RADAR BEACON CHANGE*
RADAR *see RADAR APPROACH*
RADAR *see RADAR DEPARTURE*
RADAR *see RADAR FIX POSTING*
RADAR *see RADAR SERVICE TERMINATION*
RADAR Advisory [Glossary]
RADAR APPROACH [2-75] [5-13] [5-90] [5-123] [5-124] [5-125] [5-130] [5-131] [5-132] [5-133] [5-134] [5-135] [5-136] [5-137] [5-138] [5-139] [5-140] [5-141] [5-142] [5-143] [5-144] [5-154] [5-163]
RADAR Approach Control Facility [Glossary]
RADAR Approach [Glossary]
RADAR Arrival [Glossary]
RADAR Contact [Glossary]
RADAR Contact Lost [Glossary]
RADAR DEPARTURE [5-90] [5-110] [5-111] [5-112] [5-113] [5-114] [5-115]
RADAR Environment [Glossary]
RADAR FIX POSTING [5-11]
RADAR Flight Following [Glossary]
RADAR Identification [Glossary]
RADAR Identified Aircraft [Glossary]
RADAR Point Out/Point Out [Glossary]
RADAR Route [Glossary]
RADAR Service [Glossary]
RADAR Service Terminated [Glossary]
RADAR SERVICE TERMINATION [5-12] [5-13] [7-80] [7-96] [7-97]
RADAR Surveillance [Glossary]
RADAR Weather Echo Intensity Levels [Glossary]
RADAR/Radio Detection And Ranging [Glossary]
Radial [Glossary]
Radio Altimeter/RADAR Altimeter [Glossary]
Radio [Glossary]
Radio Magnetic Indicator/RMI [Glossary]
RCC [9-3] [9-15] [9-17] [9-18] [9-19] [9-20] [9-26]
RCR [3-33] [4-70]
Read Back [Glossary]
Receiving Controller/Facility [Glossary]
Release Time [Glossary]
Remote Communications Air/Ground Facility/RCAG [Glossary]
Remote Communications Outlet/RCO [Glossary]
Remote Transmitter/Receiver/RTR [Glossary]
Report [Glossary]
Reporting Point [Glossary]
Request Full Route Clearance/FRC [Glossary]
Rescue Coordination Center/RCC [Glossary]
RESPONSIBILITY *see CONTROLLER RESPONSIBILITY*
RESPONSIBILITY *see PILOT RESPONSIBILITY*
RESPONSIBILITY *see SEPARATION RESPONSIBILITY*
RESTRICTED APPROACH [3-83] [3-84] [3-103] [3-128] [4-70] [4-85] [5-91] [6-63]
Resume Own Navigation [Glossary]
RNAV [2-30] [2-35] [2-52] [2-57] [2-90] [4-2] [4-5] [4-21] [4-22] [4-30] [4-31] [4-34] [4-53] [4-60] [4-80] [5-70] [5-90] [5-91] [6-31] [6-32] [6-34] [6-40] [6-43] [6-44] [10-12]
RNAV Approach [Glossary]
Road Reconnaisance/RC [Glossary]
ROGER [Glossary]
ROUTE AMENDMENT [2-31] [4-14] [5-91]
Route [Glossary]
Route Segment [Glossary]
Runway Condition Reading/RCR [Glossary]
Runway [Glossary]
Runway Gradient [Glossary]
Runway Markings [Glossary]
Runway Profile Descent [Glossary]
Runway Use Program [Glossary]
Runway-In Use/Active Runway/Duty Runway [Glossary]
RVR [2-120] [2-121] [2-122] [3-44] [3-50] [3-84]

S

SAC MITO [8-35]
SAFE AIR [2-74]
Safety Advisory [Glossary]
SAFI [2-4] [2-86] [8-3]
Sail Back [Glossary]
SAME COURSE DEPARTURE [5-113]
SAMP [2-4] [8-36]
Say Again [Glossary]
Say Altitude [Glossary]
Say Heading [Glossary]
Sea Lane [Glossary]
SEARCH AND RESCUE [9-3]
Search And Rescue Facility [Glossary]
See And Avoid [Glossary]
Segmented Circle [Glossary]
Segments Of An Instrument Approach Procedure [Glossary]
SELECTED ALTITUDE LIMITS [5-194]
SEPARATION *see DEPARTURE SEPARATION*
SEPARATION *see SEPARATION RESPONSIBILITY*
SEPARATION *see VERTICAL SEPARATION*
SEPARATION *see VISUAL SEPARATION*
Separation [Glossary]
Separation Minima [Glossary]
SEPARATION RESPONSIBILITY [2-13] [2-15] [3-121] [5-65] [5-66] [5-124] [5-125] [6-61] [6-64] [7-2] [7-20] [8-43] [10-1]
Severe Weather Avoidance Plan/SWAP [Glossary]
Short Range Clearance [Glossary]
Short Takeoff And Landing Aircraft/STOL Aircraft [Glossary]
SID [2-17] [3-102] [4-5] [4-10] [4-14] [4-21] [4-22] [5-91]
SIDE-STEP APPROACH [4-86]
SIDE-STEP MANUEVER [4-86]
Sidestep Maneuver [Glossary]
SIDS [6-40]
SIGMET [2-101] [2-102]
Significant Meteorological Information/SIGMET [Glossary]
Simplified Directional Facility/SDF [Glossary]
SIMULATED FLAMEOUT [3-134]
Simulated Flameout/SFO [Glossary]
SIMULTANEOUS APPROACH [3-52] [5-13] [5-126] [5-180] [7-31] [7-33]
SIMULTANEOUS DEPARTURE [5-113]
Simultaneous ILS Approaches [Glossary]
Single Direction Routes [Glossary]
SINGLE FREQUENCY APPROACH [4-62]
Single Frequency Approach/SFA [Glossary]
Single-Piloted Aircraft [Glossary]

Slash [Glossary]
Slow Taxi [Glossary]
SMOKE COLUMN AVOIDANCE [9-73]
SNOW TIME [5-5] [8-37]
Speak Slower [Glossary]
Special Emergency [Glossary]
Special Use Airspace [Glossary]
SPECIAL USE FREQUENCIES [8-31]
Special VFR Conditions [Glossary]
Special VFR Operations [Glossary]
SPECIFIED ALTITUDE [2-6] [3-11] [4-21] [4-22] [4-30] [4-41] [4-45] [4-84] [4-89] [4-90] [4-91] [5-25] [5-39] [5-142] [5-144] [5-153] [5-182] [5-194] [6-60] [7-35] [8-26] [8-70] [10-6]
SPEED ADJUSTMENT [2-52] [2-53] [2-84] [5-100] [5-101] [5-102] [5-104] Speed Adjustment110.1005-103
Speed Adjustment [Glossary]
Speed Brakes/Dive Brakes [Glossary]
Squawk (Mode, Code, Function) [Glossary]
STAGE I, II, & III SERVICES [1-4] [3-102] [5-13] [7-10] [7-60] [7-70] [7-71] [7-72] [7-73] [7-74] [7-75] [7-76] [7-77] [7-78] [7-79] [7-80] [7-90] [7-91] [7-92] [7-93] [7-94] [7-95] [7-96] [7-97]
Stand By [Glossary]
Standard Instrument Departure/SID [Glossary]
Standard Rate Turn [Glossary]
Standard Terminal Arrival/STAR [Glossary]
STAR [4-50] [4-51] [4-60] [5-91]
Stationary Reservations [Glossary]
Step Taxi [Glossary]
Step Turn [Glossary]
Stepdown Fix [Glossary]
Stereo Route [Glossary]
Stop Altitude Squawk [Glossary]
Stop Squawk (Mode Or Code) [Glossary]
Stop Stream/Burst/Buzzer [Glossary]
Stop-And-Go [Glossary]
Stop-Over Flight Plan [Glossary]
Stopway [Glossary]
Straight-In Approach - IFR [Glossary]
Straight-In Approach - VFR [Glossary]
Straight-in Landing [Glossary]
Substitute Route [Glossary]
SUCCESSIVE DEPARTURE [5-113] [7-10]
Sunset And Sunrise [Glossary]
Surveillance Approach [Glossary]
SVFR [2-4] [7-40] [10-15]
System Strategic Navigation/SN [Glossary]

T

T-VOR/Terminal-Very High Frequency Omnidirectional Range Station [Glossary]
TACAN-Only Aircraft [Glossary]
Tactical Air Navigation/TACAN [Glossary]
Target [Glossary]
Target Symbol [Glossary]
Taxi [Glossary]
Taxi Into Position And Hold [Glossary]
Taxi Patterns [Glossary]
TCA [5-13] [7-10] [7-90] [7-94] [7-97]
Terminal Area Facility [Glossary]
Terminal Area [Glossary]
Terminal RADAR Program [Glossary]
Terminal RADAR Service Area/TRSA [Glossary]
Terrain Following/TF [Glossary]
Tetrahedron [Glossary]
That Is Correct [Glossary]
Threshold Crossing Height/TCH [Glossary]
Threshold [Glossary]
TIME CHECK [1-20] [2-84] [4-23] [6-65]
Time Group [Glossary]
TIMED APPROACH [4-80] [5-124] [6-60] [6-61] [6-62] [6-63] [6-64] [6-65] [6-66] [10-1]
Torching [Glossary]
Touch And Go/Touch And Go Landing [Glossary]
Touchdown [Glossary]
Touchdown Zone Elevation/TDZE [Glossary]
Touchdown Zone [Glossary]
Tower En Route Control Service/Tower To Tower [Glossary]
Tower/Airport Traffic Control Tower [Glossary]
TPX-42 [Glossary]
Track [Glossary]
Traffic Advisories [Glossary]
TRAFFIC ADVISORY [2-6] [2-16] [2-20] [2-21] [3-6] [3-8] [3-9] [3-34] [4-66] [4-71] [4-87] [5-3] [5-10] [5-166] [7-10] [7-60] [7-79] [7-96] [7-97] [8-70] [8-71] [8-83] [10-51]
TRAFFIC ALERT [2-6]
Traffic Alert [Glossary]
Traffic [Glossary]
Traffic In Sight [Glossary]
Traffic Information [Glossary]
Traffic No Longer A Factor [Glossary]
Traffic Pattern [Glossary]
Transcribed Weather Broadcast/TWEB [Glossary]
Transfer Of Control [Glossary]
Transferring Controller/Facility [Glossary]
Transition [Glossary]
Transmissometer [Glossary]
Transmitting In The Blind/Blind Transmission [Glossary]
Transponder [Glossary]
TRSA [4-90] [5-13] [7-90] [7-91] [7-92] [7-94] [7-96]
Turbojet Aircraft [Glossary]
Turboprop Aircraft [Glossary]
TURBULENCE *see WAKE TURBULENCE*
TURBULENCE *see WAKE TURBULENCE CAUTIONARY ADVISORY*
TURBULENCE *see WAKE TURBULENCE MINIMA*

U

Ultrahigh Frequency/UHF [Glossary]
Unable [Glossary]
UNCONTROLLED AIRSPACE [4-34] [5-90]
Uncontrolled Airspace [Glossary]
Under-The-Hood [Glossary]
UNICOM [Glossary]
UNMANNED FREE BALLOONS [8-70] [8-71]
UNMONITORED NAVAIDS [4-56]
Unpublished Route [Glossary]
UNSCHEDULED LANDING [8-12]
Urgency [Glossary]
UTM [1-4] [2-40]

INDEX—Continued

[References are to Paragraph numbers]

V

Vector [Glossary]
VECTORS [1-4] [2-3] [2-20] [2-21] [2-52] [2-53] [2-111] [3-9] [3-121] [4-21] [4-30] [4-31] [4-33] [4-51] [4-64] [4-65] [4-71] [4-80] [4-88] [5-6] [5-7] [5-8] [5-57] [5-70] [5-90] [5-91] [5-111] [5-112] [5-120] [5-122] [5-123] [5-126] [5-132] [5-133] [6-60] [6-61] [6-65] [7-31] [7-32] [7-33] [7-42] [7-60] [7-70] [7-76] [7-97] [8-20] [8-29] [8-30] [8-41] [8-60] [9-25] [9-29] [9-31] [10-1] [10-34]
Verify [Glossary]
Verify Specific Direction Of Takeoff (Or Turns After Takeoff) [Glossary]
VERTICAL SEPARATION [2-3] [4-84] [4-90] [5-8] [5-73] [5-75] [5-194] [5-213] [6-20] [6-32] [6-41] [6-50] [6-51] [6-52] [6-53] [6-61] [7-20] [7-35] [7-43] [7-92] [8-29] [8-30] [8-38] [8-70] [9-71] [10-11] [10-32]
Vertical Separation [Glossary]
Vertical Takeoff And Landing Aircraft/VTOL Aircraft [Glossary]
Very High Frequency/VHF [Glossary]
Very Low Frequency/VLF [Glossary]
VFR ADVISORY SERVICE [5-29]
VFR Aircraft/VFR Flight [Glossary]
VFR ALTITUDE ASSIGNMENT [7-94]
VFR Conditions [Glossary]
VFR Military Training Routes/VR [Glossary]
VFR Not Recommend [Glossary]
VFR RELEASE [4-27]
VFR-On-Top [Glossary]
Video Map [Glossary]
Visibility [Glossary]
VISUAL *see CHARTED VISUAL APPROACH*
VISUAL *see DVFR*
VISUAL *see SVFR*
VISUAL *see VISUAL APPROACH*
VISUAL *see VISUAL SEPARATION*
VISUAL *see VFR ADVISORY SERVICE*
VISUAL *see VFR ALTITUDE ASSIGNMENT*
VISUAL *see VFR RELEASE*
VISUAL APPROACH [2-19] [2-20] [3-42] [3-121] [4-62] [4-63] [4-65] [4-71] [4-72] [4-80] [5-13] [7-10] [7-30] [7-31] [7-32] [7-33] [7-34] [7-35] [7-76] [10-16] [10-35]
Visual Approach [Glossary]
Visual Descent Point/VDP [Glossary]
Visual Flight Rules/VFR [Glossary]
Visual Holding [Glossary]
Visual Meteorological Conditions/VMC [Glossary]
VISUAL SEPARATION [2-19] [2-20] [3-9] [3-92] [5-124] [5-126] [7-1] [7-10] [7-30] [7-31] [7-32] [7-33] [7-48] [7-92] [10-1] [10-3] [10-14]
Visual Separation [Glossary]
VOR/Very High Frequency Omnidirectional Range Station [Glossary]
VORTAC/VHF Omnidirectional Range/Tactical Air Navigation [Glossary]
Vortices/Wing-Tip Vortices [Glossary]
VOT/VOR Test Signal [Glossary]

W

WAKE TURBULENCE [1-4] [1-23] [2-19] [2-20] [3-82] [3-106] [3-108] [3-109] [3-110] [3-123] [3-124] [3-140] [3-141] [3-145] [5-72] [5-74] [5-124] [6-4] [6-5] [6-64] [7-30] [7-34] [9-6] [10-31] [10-34]
WAKE TURBULENCE CAUTIONARY ADVISORY [2-20] [3-109] [3-123] [3-124]
Wake Turbulence [Glossary]
WAKE TURBULENCE MINIMA [3-110] [5-72] [6-5] [10-31] [10-34]
WARNING AREA [5-33] [6-42]
WAYPOINT [2-30] [2-52] [2-92] [4-5] [4-21] [4-31] [5-91]
WEATHER [2-4] [2-13] [2-100] [2-101] [2-102] [2-103] [2-104] [2-105] [2-106] [2-111] [2-122] [3-34] [3-35] [3-100] [3-121] [4-50] [4-64] [4-67] [4-68] [4-72] [4-82] [4-86] [5-120] [5-125] [5-126] [5-130] [5-131] [5-133] [5-141] [5-180] [5-30] [6-61] [6-63] [6-64] [6-66] [7-10] [7-30] [7-31] [7-32] [7-34] [7-35] [7-40] [7-44] [7-45] [7-47] [7-77] [8-29] [8-31] [8-50] [9-10] [9-13] [9-23] [9-24] [9-27] [9-29] [9-50] [9-53] [9-54] [9-55] [10-15] Weather72-1106 02-11
WEATHER ADVISORIES [2-101] [3-34]
Weather Advisory/WS/WA [Glossary]
WEATHER ASSISTANCE [9-23] [9-24]
WILCO [Glossary]
WIND SHEAR [2-102] [2-103] [3-8] [3-120] [5-125] [5-126]
Wind Shear [Glossary]
Words Twice [Glossary]

☆U.S. GOVERNMENT PRINTING OFFICE: 1984 421 434 10004

Ai 7/3/1984/ch.1

CHANGE

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

7110.65D CHG 1

NEWARK PUBLIC LIBRARY

11/19/84

JAN 14 1985
U. S. GOVT. PUBS
DEPOSITORY 376

SUBJ: AIR TRAFFIC CONTROL

1. PURPOSE. This change transmits revised pages for Order 7110.65D, Air Traffic Control.

2. EXPLANATION OF CHANGES. The significant changes are listed below. If further information is desired, contact the office shown in parentheses.

a. 2-59. CONTROL SYMBOLOGY. Addresses the coodination strip marking procedures concerning "wrong altitude for direction of flight" information. (ATO-330.6)

b. 2-72. ENSURING ACKNOWLEDGEMENT. States specifically that controllers are accountable for ensuring acknowledgement of any ATC clearance, instruction, or procedure, and renumbers paragraphs 2-73 through 2-89. (ATO-330.3)

c. 3-123. INTERSECTING RUNWAY SEPARATION. Corrects the reference in 3-123b. (ATO-320.7)

d. 7-49. LOCAL PROCEDURES. Adds "Terminal." (ATO-330.10)

e. Appendix A PILOT/CONTROLLER GLOSSARY Adds a description of "Ultralight Vehicle." (ATO-320.2)

f. Appendix B. AIRCRAFT WEIGHT CLASSES AND GROUPS.
   (1) Changes the civil type designator of Cessna 140 from C140 to C14. (ATO-330.8)

   (2) Adds Construcciones Aeronauticas Model 212. (ATO-320.3)

3. EFFECTIVE DATE This change is effective February 14, 1985.

4. DISPOSITION OF TRANSMITTAL This transmittal is to be retained until superseded by a new basic order.

5. PAGE CONTROL CHART See the attachment for the Page Control Chart.

R. J. Van Vuren
Associate Administrator for
Air Traffic

Distribution: ZAT-710 (ALL)

Initiated By: ATO-300

TD4.308:

PAGE CONTROL CHART

REMOVE PAGES DATED 10/25/84	INSERT PAGES DATED 2/14/85
2-ii	2-ii
2-17 through 2-26	2-17 through 2-26
3-4	3-4
3-15	3-15
3-17 and 3-18	3-17 and 3-18
3-26	3-26
4-11 and 4-12	4-11 and 4-12
4-18 and 4-19	4-18 and 4-19
4-21 and 4-22	4-21 and 4-22
5-17	5-17
7-5 and 7-6	7-5 and 7-6
7-8	7-8
7-15	7-15
10-i	10-i
10-1 and 10-2	10-1 and 10-2
A-1	A-1
A-22	A-22
A-38 through A-41	A-38 through A-41
B-1 through B-5	B-1 through B-5
C-1 through C-9	C-1 through C-9
D-2 through D-4	D-2 through D-4
I-1 through I-11	I-1 through I-11

TABLE OF CONTENTS

Page

Chapter 2. GENERAL

Section 1. GENERAL

2-1 ATC Service 2-1
2-2 Duty Priority 2-1
2-3 Procedural Preference 2-1
2-4 Operational Priority 2-1
2-5 Expeditious Compliance 2-2
2-6 Safety Advisory 2-2
2-7 In-Flight Equipment Malfunctions 2-3
2-8 Minimum Fuel 2-3
2-9 Reporting Essential Flight Information 2-3
2-10 NAVAID Malfunctions 2-3
2-11 Use of MARSA 2-3
2-12 Military Procedures 2-4
2-13 Formation Flights 2-4
2-14 Coordinate Use of Airspace 2-4
2-15 Control Transfer 2-4
2-16 Airport Traffic Areas 2-4
2-17 Radio Communications Transfer 2-5
2-18 Operational Requests 2-5
2-19 Wake Turbulence 2-5
2-20 Wake Turbulence Cautionary Advisories 2-6
2-21 Traffic Advisories 2-6
2-22 Bird Activity Information 2-7
2-23 Transfer of Position Responsibility 2-8
2-24—2-29 Reserved 2-8

Section 2. FLIGHT PLANS AND CONTROL INFORMATION

2-30 Recording Information 2-9
2-31 Forwarding Information 2-9
2-32 Forwarding VFR Data 2-9
2-33 Military DVFR Departures 2-9
2-34 IFR to VFR Flight Plan Change 2-9
2-35 IFR Flight Progress Data 2-9
2-36 Manual Input of Computer Assigned Beacon Codes 2-10
2-37 ALTRV Information 2-10
2-38 Computer Message Verification 2-10
2-39 Transmit Proposed Flight Plan 2-10
2-40 Forwarding Amended and UTM Data 2-11
2-41 Airborne Military Flights 2-11
2-42 Forwarding Flight Plan Data Between U.S. ARTCC's and Canadian ACC's 2-11
2-43 Teletype Flight Data Format—U.S. ARTCCs—Canadian ACC 2-11
2-44—2-49 Reserved 2-12

Section 3. FLIGHT PROGRESS STRIPS

2-50 General 2-13
2-51 Arrangement of Postings 2-14
2-52 Data Entries 2-14
2-53 Data Entries 2-15
2-54 Aircraft Identify 2-16
2-55 Aircraft Type 2-17
2-56 USAF/USN Undergraduate Pilots 2-17

TABLE OF CONTENTS—Continued

Page

Chapter 2. GENERAL

2-57 Aircraft Equipment Suffix 2-17
2-58 Clearance Status 2-17
2-59 Control Symbology 2-17
2-60—2-69 Reserved 2-19

Section 4. RADIO AND INTERPHONE COMMUNICATIONS

2-70 Radio Communications 2-20
2-71 Monitoring 2-20
2-72 Ensuring Acknowledgement 2-20
2-73 Authorized Interruptions 2-20
2-74 Authorized Transmissions 2-20
2-75 Authorized Relays 2-20
2-76 Radio Message Format 2-20
2-77 Abbreviated Transmissions 2-20
2-78 Interphone Transmission Priorities 2-21
2-79 Priority Interruption 2-21
2-80 Interphone Message Format 2-21
2-81 Interphone Message Termination 2-21
2-82 Words and Phrases 2-21
2-83 Emphasis for Clarity 2-21
2-84 ICAO Phonetics 2-22
2-85 Numbers Usage 2-22
2-86 Facility Identification 2-23
2-87 Aircraft Identification 2-24
2-88 Description of Aircraft Types 2-25
2-89 Reserved 2-26

Section 5. ROUTE AND NAVAID DESCRIPTION

2-90 Airways and Routes 2-27
2-91 NAVAID Terms 2-27
2-92 NAVAID Fixes 2-27
2-93—2-99 Reserved 2-27

Section 6. WEATHER INFORMATION

2-100 Familiarization 2-28
2-101 SIGMET or CWA Alert 2-28
2-102 PIREP Information 2-28
2-103 Weather and Chaff Services 2-29
2-104 Calm Wind Conditions 2-29
2-105 Reporting Weather Conditions 2-29
2-106 Disseminating Weather Information 2-30
2-107—2-109 Reserved 2-30

Section 7. ALTIMETER SETTINGS

2-110 Current Settings 2-31
2-111 Altimeter Settings Issuance Below Lowest Usable FL 2-31
2-112—2-119 Reserved 2-31

Section 8. RUNWAY VISIBILITY REPORTING — TERMINAL

2-120 Furnish RVR/RVV Values 2-32
2-121 Arrival/Departure Runway Visibility 2-32
2-122 Terminology 2-32

(2) Pronounceable words of 3, 4, 5, and 6 letters followed by a 4-, 3-, 2-, or 1-digit number.

2-54b(2) Example. —

"SAMP 316."

(3) Assigned double-letter 2-digit flight number.

(4) Navy or Marine fleet and training command aircraft, one of the following:

(a) The service prefix and 2 letters (use phonetic alphabet equivalent), followed by 2 or 3 digits.

(b) The service prefix and a digit and a letter (use phonetic alphabet equivalent) followed by 2 or 3 digits.

c. Special-use — Approved special-use identifiers.

2-55 AIRCRAFT TYPE

Use the approved codes listed in the Contractions Handbook to indicate aircraft type.

2-56 USAF/USN UNDERGRADUATE PILOTS

To identify aircraft piloted by solo USAF/USN undergraduate student pilots (who may occasionally request revised clearances because they normally are restricted to flight in VFR conditions), the aircraft identification in the flight plan shall include the letter "Z" as a suffix. Do not use this suffix, however, in ground-to-air communication.

2-56 Note. — USAF solo students who have passed an instrument certification check may penetrate cloud layers in climb or descent only. Requests for revised clearances to avoid clouds in level flight can still be expected. This does not change the requirement to use the letter "Z" as a suffix to the aircraft identification.

2-56 Reference. — Order 7610.4, Part 11, Chapter 34.

2-57 AIRCRAFT EQUIPMENT SUFFIX

a. Indicate, for both VFR and IFR operations, the aircraft's radar transponder, DME, or RNAV capability by adding the appropriate symbol, preceded by a slant as follows:

/X	No Transponder.
/T	Transponder with no altitude encoding capability.
/U	Transponder with altitude encoding capability.
/D	DME, no transponder.
/B	DME, transponder with no altitude encoding capability.
/A	DME, transponder with altitude encoding capability
/M	TACAN-only, no transponder.
/N	TACAN-only, transponder with no altitude capability.
/P	TACAN-only, transponder with altitude encoding capability.
/C	RNAV, transponder with no altitude encoding capability.
/R	RNAV, transponder with altitude encoding capability.
/W	RNAV and no transponder.

b. When forwarding this information, state the aircraft type followed by the word "slant" and the appropriate phonetic letter equivalent of the suffix.

2-57 Examples. —

"D-C six slant tango."

"F-four-C slant november."

"F-eight-E slant papa."

"Seven-oh-seven slant foxtrot."

2-58 CLEARANCE STATUS

Use an appropriate clearance symbol followed by a dash (—) and other pertinent information to clearly show the clearance status of an aircraft. To indicate delay status use:

a. The symbol "H" at the clearance limit when holding instructions have been included in the aircraft's original clearance. Show detailed holding information following the dash when holding differs from the established pattern for the fix; i.e., turns, leg lengths, etc.

b. The symbols "F" or "O" to indicate the clearance limit when a delay is not anticipated.

2-59 CONTROL SYMBOLOGY

Use authorized control and clearance symbols or abbreviations for recording clearances, reports, and instructions. Control status of aircraft must always be current. You may use:

a. Plain language markings when it will aid in understanding information.

b. Locally approved identifiers. Use these only within your facility and not on teletypewriter or interphone circuits.

c. Plain sheets of paper to record information when flight progress strips are not used.

2-59 Table 1. — Clearance Abbreviations

Abbreviation	Meaning
A	Cleared to airport (point of intended landing)
B	Center clearance delivered
C	ATC clears (when clearance relayed through non-ATC facility)
CAF	Cleared as filed
D	Cleared to depart from the fix
F	Cleared to the fix
H	Cleared to hold and instructions issued
L	Cleared to land
N	Clearance not delivered
O	Cleared to the outer marker
PD	Cleared to climb/descend at pilot's discretion
Q	Cleared to fly specified sectors of a NAVAID defined in terms of courses, bearings, radials or quadrants within a designated radius.
T	Cleared through (for landing and takeoff through intermediate point)
V	Cleared over the fix
X	Cleared to cross (airway, route, radial) at (point)
Z	Tower jurisdiction

2-59 Table 2. — Miscellaneous Abbreviations

Abbreviation	Meaning
BC	Back course approach
CT	Contact approach
I	Initial approach
FA	Final approach
MA	Missed approach
NDB	Nondirectional radio beacon approach
SI	Straight-in approach
TA	TACAN approach
TL	Turn left
TR	Turn right
VA	Visual approach
VR	VOR approach
ILS	ILS approach
OTP	VFR conditions-on-top
PT	Procedure turn
RX	Report crossing
RP	Report immediately upon passing (fix/altitude)
SA	Surveillance approach
PA	Precision approach

2-59 Table 3. Control Information Symbols

Symbol	*Meaning*
T→( )	Depart (direction, if specified)
↑	Climb and maintain
↓	Descend and maintain
→	Cruise
@	At
X	Cross
M→	Maintain
7̿	Join or intercept airway/jet route/track or course
=	While in controlled airspace
△	While in control area
↘△	Enter control area
△↗	Out of control area
NW↘⊙ ⊘↗NE ⊖→E	Cleared to enter, depart, or cleared through control zone. Indicate direction of flight by arrow and appropriate compass letter. Maintain Special VFR/IFR conditions (altitude, if appropriate), while in control zone.
250K	Aircraft requested to adjust speed to 250 knots.
−20K	Aircraft requested to reduce speed 20 knots.
+30K	Aircraft requested to increase speed 30 knots.
Ⓦ	Local Special VFR operations in the vicinity of (name) airport are authorized until (time). Maintain special VFR conditions (altitude, if appropriate).
>	Before
<	After or Past
$\underline{170}$ (red)	Inappropriate altitude/flight level for direction of flight. (Underline assigned altitude/flight level in red.)
/	Until
( )	Alternate instructions
$\overline{\text{Restriction}}$	Restriction
↧	At or Below
↥	At or Above
—(Dash)	From—to (route, time, etc.)
(Alt)B(Alt)	Indicates a block altitude assignment. Altitudes are inclusive, and the first altitude shall be lower than the second. *Example:* 310B370
V<	Clearance void if aircraft not off ground by (time)
CL	Pilot cancelled flight plan
✓	*EN ROUTE:* Aircraft has reported at assigned altitude. *Example:* 80✓
✓	*TERMINAL:* Information forwarded (indicated information forwarded as required)
○ (red)	*EN ROUTE:* Information or revised information forwarded. (Circle, in red, inappropriate altitude/flight level for direction of flight or other control information when coordinated. Also circle, in red, the time (minutes) and altitude when a flight plan or estimate is forwarded. Use this method in both inter-center and intra-center coordination.)
㊿	Other than assigned altitude reported (circle reported altitude)
$\left\lvert\frac{10}{6}\right\rvert$	DME holding (use with mileages) (Upper figure indicates distance from station to DME fix, lower figure indicates length of holding pattern. In this example, the DME fix is 10 miles out with a 6 mile pattern indicated.)
$\overparen{\text{(Mi.) (dir.)}}$	DME arc of VORTAC or TACAN
C(Freq.)	Contact (facility) on (freq.), (time, fix, or altitude, if appropriate). Insert frequency only when it is other than standard.
R	Radar contact
R	*EN ROUTE:* Requested altitude (preceding altitude information)
R̸	Radar service terminated
✗	Radar contact lost
Ⓡ	Radar handoff (circle symbol when handoff completed)
RV	Radar vector
R✗	Pilot resumed own navigation
E (red)	EMERGENCY
W (red)	WARNING
P	Point out initiated. Indicate the appropriate facility, sector, or position. *Example:* PZFW.

NOTE.—The absence of an airway or route number between two fixes in the route of flight indicates "direct"; no symbol or abbreviation is required.

2-60 thru 2-69 RESERVED

Section 4. RADIO AND INTERPHONE COMMUNICATIONS

2-70 RADIO COMMUNICATIONS

Use radio frequencies for the special purposes for which they are intended. A single frequency may be used for more than one function except as follows:

TERMINAL: When combining positions in the tower, do not use ground control frequency for airborne communications.

2-70 Note. — Due to the limited number of frequencies assigned to towers for the ground control function, it is very likely that airborne use of a ground control frequency could cause interference to other towers or interference to your aircraft from another tower. When combining these functions, it is recommended combining them on local control. The ATIS may be used to specify the desired frequency.

2-71 MONITORING

Monitor interphones and assigned radio frequencies continuously.

2-71 Note. — Although all FAA facilities, including RAPCON's and RATCF's, are required to monitor all assigned frequencies continuously, USAF facilities may not monitor all unpublished discrete frequencies.

2-72 ENSURING ACKNOWLEDGEMENT

a. When issuing information, clearances, or instructions, ensure acknowledgement by the pilot.

b. If altitude, heading, or other items are read back by the pilot, ensure the readback is correct. If incorrect, distorted, or incomplete, make correction as appropriate.

2-73 AUTHORIZED INTERRUPTIONS

As necessary, authorize a pilot to interrupt his communications guard.

2-73 Note. — Some users have adopted procedures to insure uninterrupted receiving capability with ATC when a pilot with only one operative communications radio must interrupt his communications guard because of a safety related problem requiring airborne communications with his company. In this event, pilots will request approval to abandon guard on the assigned ATC frequency for a mutually agreeable time period. Additionally, they will inform controllers of the NAVAID voice facility and the company frequency they will monitor.

2-74 AUTHORIZED TRANSMISSIONS

Transmit only those messages necessary for air traffic control or otherwise contributing to air safety.

2-74 Reference. — Order 7210.3 — 321.

2-75 AUTHORIZED RELAYS

a. Relay operational information to aircraft or aircraft operators as necessary. Do not agree to handle such messages on a regular basis. Give the source of any such message you relay.

b. Relay official FAA messages as required.

2-75b Note. — The FAA Administrator and Deputy Administrator will sometimes use code phrases to identify themselves in air-to-ground communications as follows:

a. Administrator — "Safe Air One."

b. Deputy Administrator — "Safe Air Two."

2-75b Example. —

"Miami Center, Jetstar One, this is Safe Air One, (message)".

c. Relay operational information to military aircraft flight planned to or operating on IR's.

2-76 RADIO MESSAGE FORMAT

Initiate radio communication with an aircraft by using the following format:

a. Initial callup:

(1) Identification of the aircraft being called.

(2) Identification of the calling unit.

(3) The type of message to follow when this will assist the pilot.

(4) The word "over" if required.

b. Replying to callup from aircraft:

(1) Identification of the aircraft initiating the callup.

(2) Identification of the replying unit.

(3) Transmit message.

(4) The word "over" if required.

c. Use the same format as for initial callup and reply after communication has been established except, after stating the identification of the calling or replying unit, state the message to be sent or acknowledge the message received.

d. Preface a clearance or instruction intended for a specific aircraft with the identification of that aircraft. *TERMINAL:* You may omit aircraft identification after initial callup when conducting the final portion of a radar approach.

2-77 ABBREVIATED TRANSMISSIONS

Transmissions may be abbreviated as follows:

a. Use the identification prefix and the last 3 digits or letters of the aircraft identification after communications have been established and the type of aircraft is known. Do not abbreviate similar sounding aircraft identifications or the identification of an air carrier or other civil aircraft having an FAA authorized call sign.

2-77a Reference. — Aircraft Identification, 2-87.

b. Omit the facility identification after communication has been established.

c. Transmit the message immediately after the callup (without waiting for the aircraft's reply) when the message is short and receipt is generally assured.

d. Omit the word "over" if the message obviously requires a reply.

2-78 INTERPHONE TRANSMISSION PRIORITIES

Give priority to interphone transmissions as follows:

a. First priority — Emergency messages including essential information on aircraft accidents or suspected accidents. After an actual emergency has passed, give a lower priority to messages relating to that accident.

b. Second priority — Clearances and control instructions.

c. Third priority — Movement and control messages using the following order of preference when possible:

(1) Progress reports.

(2) Departure or arrival reports.

(3) Flight plans.

d. Fourth priority — Movement messages on VFR aircraft.

2-79 PRIORITY INTERRUPTION

Use the words "emergency" or "control" for interrupting lower priority messages when you have an emergency or control message to transmit.

2-80 INTERPHONE MESSAGE FORMAT

Use the following format for interphone (override/handoff line) intra/interfacility communications:

a. The caller states the identification of the position being called followed by the position identification of the caller.

b. The receiver states the position identification followed by an acknowledgment of the call.

2-80b Note. — If operationally beneficial, a. and b. may be reversed.

c. The caller states the message.

d. The receiver states the response to the caller's message followed by the receiver's operating initials.

e. The caller states his or her operating initials.

2-80 Example 1. —

Caller — "Denver High, R Twenty-five."

Receiver — "Denver High."

Caller — "Request direct Denver for Eastern Three Twenty-eight."

Receiver — "Eastern Three Twenty-eight direct Denver approved. H.F."

Caller — "G.M."

2-80 Example 2. —

Receiver — "Denver High, go ahead override."

Caller — "R Twenty-five, request direct Denver for Eastern Three Twenty-eight."

Receiver — "Eastern Three Twenty-eight direct Denver approved. H.F."

Caller — "G.M."

2-81 INTERPHONE MESSAGE TERMINATION

Terminate interphone messages with your operating initials.

2-82 WORDS AND PHRASES

Use the words or phrases in radiotelephone and interphone communication as contained in the Glossary, Appendix A. The word "heavy" shall be used in inter/intra facility communications for heavy jet identification and in communications with heavy jet aircraft.

2-82 Example. —

"United Fifty-eight heavy."

2-82 Note. — Most airlines will use the word "heavy" following the company prefix and trip number when establishing communications or when changing frequencies within a terminal facility's area.

2-83 EMPHASIS FOR CLARITY

Emphasize appropriate digits, letters, or similar sounding words to aid in distinguishing between similar sounding aircraft identifications. Additionally:

a. Notify each pilot concerned when communicating with aircraft having similar sounding identifications.

2-83a Examples. — "United Thirty-one United, Miami Center, Eastern Thirty-one is also on this frequency, acknowledge." "Eastern Thirty-one Eastern, Miami Center, United Thirty-one is also on this frequency, acknowledge."

2-83a Reference. — Aircraft Identification, 2-87. Order 7210.3 — 210, Aircraft Identification Problems.

b. Identify the interphone voice line on which the call is being made when two or more such lines are collocated at the receiving operating position.

2-83b Examples. —

"Washington Center, Washington Approach on the 57 line." "Chicago Center, O'Hare Tower handoff on the Departure West line."

2-84 ICAO PHONETICS

Use the ICAO phonetic alphabet in the Table to clarify the individual letter, as necessary.

2-84 Table. — ICAO Phonetics

A — Alfa
B — Bravo
C — Charlie
D — Delta
E — Echo
F — Foxtrot
G — Golf
H — Hotel
I — India
J — Juliett
K — Kilo
L — Lima
M — Mike
N — November
O — Oscar
P — Papa
Q — Quebec
R — Romeo
S — Sierra
T — Tango
U — Uniform
V — Victor
W — Whiskey
X — X-ray
Y — Yankee
Z — Zulu

2-85 NUMBERS USAGE

State numbers as follows:

a. Serial numbers — The separate digits.

2-85a Examples. —

Number	*Statement*
11,495	"One one four niner five."
20,069	"Two zero zero six niner."

b. Altitudes or flight levels:

(1) Altitudes — The separate digits of the thousand plus the hundreds.

2-85b(1) Example. —

Altitude	*Statement*
17,900	"One seven thousand niner hundred."

(2) Flight levels — The words "flight level" followed by the separate digits of the flight level.

2-85b(2) Examples. —

Flight level	*Statement*
180	"Flight level one eight zero"
275	"Flight level two seven five."

(3) MDA/DH Altitudes — The separate digits of the MDA/DH altitude

2-85b (3) Examples. —

MDA/DH Altitude	*Statement*
1,320	"Published minimum descent altitude, one three two zero"
486	"Published decision height, four eight six"

c. Time:

(1) General time information — The 4 separate digits of the hour and minutes based on the 24-hour clock in terms of Greenwich Mean Time (GMT).

2-85c(1) Examples. —

Time (12 hr.)	*Time (24 hr.)*	*Statement*
1:15 a.m.	0115	"Zero one one five."
1:15 p.m.	1315	"One three one five."

(2) Upon request — The 4 separate digits of the hours and minutes in terms of GMT, followed by the local standard time equivalents.

2-85c(2) Example. —

Time	*Statement*
1430 PST (2230 GMT)	"Two two three zero Greenwich, one four three zero Pacific."

(3) Time check — The word "time" followed by the 4 separate digits of the hour and minutes, and nearest quarter minute.

2-85c(3) Example. —

Time	*Statement*
1415 ¾	"Time, one four one five and three-quarters."

(4) Abbreviated time — The separate digits of the minutes only.

2-85c(4) Examples. —

Time	*Statement*
1415	"One five."
1420	"Two zero."

d. Field elevation — The words "field elevation" followed by the separate digits of the elevation.

2-85d Examples. —

Elevation	*Statement*
17 feet	"Field elevation, one seven."
817 feet	"Field elevation, eight one seven."
2,817 feet	"Field elevation, two eight one seven."

e. The number "0," except where it appears in group form — The word "zero."

2-85e Example. —

"Field elevation one six zero."

f. Altimeter setting — The word "altimeter" followed by the separate digits of the altimeter setting.

2-85f Example. —

Setting	*Statement*
30.01	"Altimeter, three zero zero one."

g. Surface wind — The word "wind" followed by the separate digits of the indicated wind direction to the nearest 10-degree multiple, the word "at," and the separate digits of the indicated velocity in knots.

2-85g Examples. —

"Wind zero three zero at two five."

"Wind two seven zero at one five peak gusts three five."

h. Heading — The word "heading" followed by the 3 separate digits of the number of degrees, omitting the word "degrees." Use heading 360 degrees to indicate a north heading.

2-85h Examples.-

Heading	*Statement*
5 degrees	"Heading zero zero five."
30 degrees	"Heading zero three zero."
360 degrees	"Heading three six zero."

i. Radar beacon codes — The separate digits of the 4-digit code.

2-85i Examples. —

Code	*Statement*
1000	"One zero zero zero."
2100	"Two one zero zero."

j. Runways — The word "runway," followed by the separate digits of the runway designation. For a parallel runway, state the word "left," "right," or "center" if the letter "L," "R," or "C" is included in the designation.

2-85j Examples. —

Designation	*Statement*
3	"Runway Three."
8L	"Runway Eight Left."
27R	"Runway Two Seven Right."

k. Frequencies —

(1) The separate digits of the frequency, inserting the word "point" where the decimal point occurs. Omit digits after the second digit to the right of the decimal point. When the frequency is in the L/MF band, include the word "kiloHertz."

2-85k(1) Examples. —

Frequency		*Statement*
126.55	MHz	"One two six point five five."
369.0	MHz	"Three six niner point zero."
121.5	MHz	"One two one point five."
135.275	MHz	"One three five point two seven."
302	kHz	"Three zero two kiloHertz."

(2) *USAF/USN:* Local channelization numbers may be used in lieu of frequencies for locally based aircraft when local procedures are established to ensure that local aircraft and ATC facilities use the same channelization.

2-85k(2) Example. —

Frequency		*Statement*
275.8	MHz	"Local channel one six."

l. Speeds —

(1) The separate digits of the speed followed by "knots", except as required by 5-101, Methods (Speed Adjustment).

2-85l(1) Examples. —

Speed	*Statement*
250	"Two five zero knots."
190	"One niner zero knots."

(2) The separate digits of the mach number preceded by "mach."

2-85l(2) Examples. —

Mach Number	*Statement*
1.5	"Mach one point five."
0.64	"Mach point six four."
0.7	"Mach point seven."

m. Miles — The separate digits of the mileage followed by the word mile.

2-85m Examples. —

"Three zero mile arc east of Nottingham."

"Traffic, one o'clock, two five miles, northbound, DC-8, flight level two seven zero."

2-86 FACILITY IDENTIFICATION

Identify facilities as follows:

a. Airport traffic control towers — State the name of the facility followed by the word "tower." Where military and civil airports are located in the same general area and have similar names, state the name of the military service followed by the name of the military facility and the word "tower."

2-86a Examples. —

"Columbus Tower."

"Barksdale Tower."

"Navy Jacksonville Tower."

b. Air route traffic control centers — State the name of the facility followed by the word "center."

c. Approach control facilities, including RAPCON's, RATCF's, and ARAC's — State the name of the facility followed by the word "approach." Where military and civil facilities are located in the same general area and have similar names, state the name of the military service followed by the name of the military facility and the word "approach."

2-86c Examples. —

"Denver Approach."

"Griffiss Approach."

"Navy Jacksonville Approach."

d. Functions within a terminal facility — State the name of the facility followed by the name of the function.

2-86d Examples. —

"Boston Departure."

"La Guardia Clearance Delivery."

"O'Hare Ground."

e. When calling or replying on an interphone line which connects only 2 facilities, you may omit the facility name.

2-86e Example. —

"Bradford High, handoff."

f. FAA flight service stations — State the name of the station followed by the word "radio."

2-86f Example —

"Pittsburgh Radio."

g. Radar facilities having ASR or PAR but not providing approach control service — State the name of the facility, followed by the letters "G-C-A."

2-86g Examples. —

"Chanute G-C-A."

"Corpus Christi G-C-A."

"Davison G-C-A."

2-87 AIRCRAFT IDENTIFICATION

Identify aircraft as follows: use the full identification in reply to aircraft with similar sounding identifications. For other aircraft, the same identification may be used in reply that the pilot used in his initial callup except use the correct identification after communications have been established.

2-87 Reference. — Abbreviated Transmissions, 2-77.

a. Civil — State the aircraft type, the model, or the manufacturer's name, or if none of these are known, the numbers/letters of the aircraft registration.

2-87a Examples. —

"Jet Commander One Four Two Four."

"Douglas Three Zero Five Romeo."

"Bonanza One Two Three Four Tango."

"November One Two Three Four Golf."

2-87a Note. — The prefix "November" denotes a U.S. aircraft registry and should be used only if the aircraft type, model, or manufacturer's name is not known.

(1) Air carrier and other civil aircraft having FAA authorized call signs — State the call sign followed by the flight number in group form.

2-87a(1) Examples. —

"American Five Twenty-one."

"Commuter Six Eleven."

"Ceneral Motors Thirty-seven."

(2) If aircraft identification becomes a problem when the procedures specified in (1) are used, the call sign shall be restated after the flight number of the aircraft involved.

2-87a(2) Examples —

"American Five Twenty-one American."

"Commuter Six Eleven Commuter."

"General Motors Thirty-seven General Motors."

2-87a(2) Reference. — Order 7210.3 — 210, Aircraft Identification Problems.

(3) Air taxi and commercial operators not having FAA authorized call signs — State the prefix "TANGO" on initial contact, if used by the pilot, followed by the registration number. The prefix may be dropped in subsequent communications.

2-87a(3) Examples. —

"Tango Mooney Five Five Five Two Quebec."

"Tango One Two Three Four."

b. Civilian airborne ambulance — State the word "LIFEGUARD" followed by the type and the numbers/letters of the registration number.

2-87b Example. —

"LIFEGUARD Cessna Two Six Four Six."

c. U.S. military — State one of the following:

(1) The service name, followed by the word "copter," when appropriate, and the last 5 digits of the serial number.

2-87c(1) Examples. —

"Navy Five Six Seven One Three."

"Coast Guard Six One Three Two Seven."

"Air Guard One Three Five Eight Six"

"Army Copter Three Two One Seven Six."

2-87c(1) Note. — If aircraft identification becomes a problem, procedures in paragraph 2-87a(2) will apply.

(2) Special military operations — State one of the following followed by the last 5 digits of the serial number:

(a) Air evacuation flights — "AIR EVAC," "MARINE AIR EVAC," or "NAVY AIR EVAC."

2-87c(2)(a) Example. —

"AIR EVAC One Seven Six Five Two."

(b) Rescue flights — (Service name) "RESCUE."

2-87c(2)(b) Example. —

"Air Force RESCUE Six One Five Seven Niner."

(c) Military Airlift Command — "MAC."

2-87c(2)(c) Example. —

"MAC Seven Eight Five Six Two."

(d) Special Air Mission — "SAM."

2-87c(2)(d) Example. —

"SAM Niner One Five Six Two."

(e) USAF Contract Aircraft — "LOGAIR."

2-87c(2)(e) Example. —

"LOGAIR Seven Five Eight Two Six."

(3) Military tactical and training:

(a) U.S. Air Force, Air National Guard, Military District of Washington priority aircraft, and USAF civil disturbance aircraft — Pronounceable words of 3, 4, 5 or 6 letters followed by a 4, 3, 2, or 1-digit number.

2-87c(3)(a) Examples. —

"Paul Two Zero."

"Pat One Five Seven."

"Gaydog Four."

2-87c(3)(a) Note. — When the "Z" suffix described in paragraph 2-56 is added to identify aircraft piloted by USAF undergraduate pilots, the call sign will be limited to a combination of six characters.

(b) Navy or Marine fleet and training command aircraft — The service name and 2 letters, or a digit and a letter (use letter phonetic equivalents), followed by 2 or 3 digits.

2-87c(3)(b) Examples. —

"Navy Golf Alfa Two One."

"Marine Four Charlie Two Three Six."

(c) NORAD interceptors — An assigned double letter 2-digit flight number.

2-87c(3)(c) Example. — "Alfa Kilo One Five."

d. Foreign registry — State one of the following:

(1) Civil — The letters or digits of the aircraft registration or call sign.

2-87d(a) Example. —

"C-F-L-R-B."

(2) Air carrier — The abbreviated name of the operating company, followed by:

(a) The letters or digits of the registration or call sign.

2-87d(2)(a) Example. —

"Air France F-L-R-L-G."

(b) The flight number in group form.

2-87d(2)(b) Example. —

"Scandinavian Sixty-eight."

(3) Military — Except Canada, the name of the country and the military service followed by the separate digits or letters of the registration or call sign. Canadian Armed Force aircraft shall be identified by the word "Canforce" followed by the separate digits of the serial number, except that the Transport Command of the Canadian Armed Force shall be identified by the words "Canadian Military" and the Canadian Coast Guard shall be identified as "Canadian Coast Guard" followed by the separate digits of the serial number.

2-87d(3) Examples. —

"CANFORCE Five Six Two Seven."

"Brazilian Air Force Five Three Two Seven Six."

e. Presidential aircraft and Presidential family aircraft:

(1) When the President is aboard a military aircraft, state the name of the military service, followed by the word "One."

2-87e(1) Examples. —

"Air Force One." 'Army One." 'Marine One."

(2) When the President is aboard a civil aircraft, state the words "Executive One."

(3) When a member of the President's family is aboard any aircraft, if the U.S. Secret Service or the White House Staff determines it is necessary, state the words "Executive One Foxtrot."

f. Vice Presidential aircraft:

(1) When the Vice President is aboard a military aircraft, state the name of the military service, followed by the word "Two."

2-87f(1) Examples. —

"Air Force Two." "Army Two." "Marine Two."

(2) When the Vice President is aboard a civil aircraft, state the words "Executive Two."

(3) When a member of the Vice President's family is aboard any aircraft, if the U.S. Secret Service or the White House Staff determines it is necessary, state the words "Executive Two Foxtrot."

g. Other special flights:

(1) Department of Energy flights — State the letters "R-A-C" (use phonetic alphabet equivalents) followed by the last 4 separate digits of the aircraft registration number.

2-87g(1) Example. —

"Romeo Alfa Charlie One Six Five Three."

(2) Semiautomatic Flight Inspections — State the code name "SAFI" followed by the separate digits of the grid number as filed.

2-87g(2) Example. —

"Denver Center, SAFI Five Two Seven."

(3) Flight Inspection of Navigational Aids — State the call sign "FLIGHT CHECK" followed by the digits of the registration number.

2-87g(3) Example. —

"Flight Check Three Niner Six Five Four."

(4) USAF aircraft engaged in aerial sampliмg missions — State the call sign "SAMP" followed by the last three digits of the serial number.

2-87g(4) Example. —

"SAMP Three One Six."

h. Use a pilot's name in identification of an aircraft only in special or emergency situations.

2-88 DESCRIPTION OF AIRCRAFT TYPES

Except as provided in d, describe aircraft as follows when issuing traffic information.

a. Military:

(1) Military designator, with numbers spoken in group form, or

2-88a(1) Examples. —

"F-Four." "B-Fifty-eight."

"Air Force bomber." "Navy fighter."

"Fighter." "Bomber."

(2) Service and type, or

(3) Type only if no confusion or misidentification is likely.

b. Air Carrier:

(1) Manufacturer's name or model.

(2) Add the company name or other identifying features when confusion or misidentification is likely.

2-88b Examples. —

"Lockheed Ten-eleven." "American Seven-oh-seven." "United Seven Thirty-seven."

2-88b Note. — *TERMINAL:* Pilots of "interchange" aircraft are expected to inform the tower on the first radio contact the name of the operating company and trip number followed by the company name, as displayed on the aircraft, and the aircraft type.

c. General Aviation and Air Taxi:

(1) Manufacturer's model, name, or designator.

(2) Add color when considered advantageous.

2-88c Examples. —

"Tri-Pacer." "PA Twenty-two."

"Cessna Three Ten." "Green Apache."

d. When issuing traffic information to aircraft following a heavy jet, specify the word "heavy" before the manufacturer's name and model.

2-88d Examples. —

"Heavy Lockheed Ten-eleven."

"Heavy Boeing Seven Forty-seven."

2-89 RESERVED

meeting their responsibilities to the aircraft operating on the runways or within the airport traffic area. They are not intended to provide radar benefits to pilots except for those accrued through a more efficient and effective local control position. In addition, local controllers at nonapproach control towers must devote the majority of their time to visually scanning the runways and local area; an assurance of continued positive radar identification could place distracting and operationally inefficient requirements upon the local controller. Therefore, since the requirements of paragraph 5-50 cannot be assured, the radar functions prescribed above are not considered to be radar services and pilots should not be advised of being in "radar contact."

b. Additional functions may be performed provided the procedures have been reviewed and authorized by appropriate management levels.

3-10 OBSERVED ABNORMALITIES

When requested by a pilot or when you deem it necessary, inform an aircraft of any observed abnormal aircraft condition.

Phraseology:

(Item) APPEAR/S (observed condition).

3-10 Examples. —

"Landing gear appears down and in place."

"Rear baggage door appears open."

3-11 AIRPORT TRAFFIC AREA RESTRICTIONS

a. If traffic conditions permit, approve a pilot's request to cross an airport traffic area or exceed the airport traffic area speed limit. Do not, however, approve a speed in excess of 250 knots (288 mph) unless the pilot informs you a higher minimum speed is required.

3-11a Note. — FAR 91.70 permits speeds in excess of 250 knots (288 mph) when so required or recommended in the airplane flight manual or required by normal military operating procedures.

3-11a Reference. — Airport Traffic Areas, 2-16.

b. Do not approve a pilot's request or ask a pilot to conduct unusual maneuvers within an airport traffic area if they are not essential to the performance of the flight.

3-11b Note. — These unusual maneuvers include unnecessary low passes, unscheduled flybys, practice instrument approaches to altitudes below specified minima (unless a landing or touch-and-go is to be made), or any so-called "buzz jobs" wherein a flight is conducted at a low altitude and/or a high rate of speed for thrill purposes. Such maneuvers increase hazards to persons and property and contribute to noise complaints.

3-12 thru 3-19 RESERVED

Section 2. VISUAL SIGNALS

3-20 LIGHT SIGNALS

Use air traffic control light signals from the Table to control aircraft and the movement of vehicles, equipment, and personnel on the movement area when radio communications cannot be employed.

3-20 Reference. — Order 7210.3 — 430, Letters of Agreement.

3-20 Table. — ATC Light Signals.

	Meaning		
Color and type of signal	*Aircraft on the ground*	*Aircraft in flight*	*Movement of vehicles, equipment, and personnel*
Steady green	Cleared for takeoff	Cleared to land	Cleared to cross; proceed; go
Flashing green	Cleared to taxi	Return for landing (to be followed by steady green at the proper time)	Not applicable
Steady red	Stop	Give way to other aircraft and continue circling	Stop
Flashing red	Taxi clear of landing area/ runway in use	Airport unsafe — do not land	Clear the taxiway/ runway
Flashing white	Return to starting point on airport	Not applicable	Return to starting point on airport
Alternating red and green	General Warning Signal — Exercise Extreme Caution		

3-21 WARNING SIGNAL

Direct a general warning signal to aircraft or vehicle operators, as appropriate, when:

3-21 Note. — The warning signal is not a prohibitive signal and can be followed by any other light signal, as circumstances permit.

a. Aircraft are converging and a collision hazard exists.

b. Mechanical trouble exists of which the pilot might not be aware.

c. Other hazardous conditions are present which call for intensified pilot or operator alertness. These conditions may include obstructions, soft field, ice on the runway, etc.

3-22 RECEIVER-ONLY ACKNOWLEDGMENT

To obtain acknowledgment from an aircraft equipped with receiver only, request the aircraft to do the following:

a. Between sunrise and sunset:

(1) Move ailerons or rudders while on the ground.

(2) "Rock" wings while in flight.

b. Between sunset and sunrise — "Blink" navigation or landing lights.

3-23 thru 3-29 RESERVED

3-82 Reference. — AC 90-23, Wake Turbulence, paragraphs 10 and 11.

3-83 RUNWAY PROXIMITY

Hold a taxiing aircraft clear of a runway as follows:

a. At established holding points marked by taxiway hold lines/signs.

b. If no hold lines/signs are established, instruct aircraft to hold short of a specific runway.

c. Issue traffic information as necessary.

3-83 Note. — Establishing hold lines/signs are the responsibility of the airport manager. Standards for accomplishing this are contained in Advisory Circulars 150/5340-1E and 150/5340-18A. Information on taxiway markings is published in the AIM.

3-83 Reference. — Taxi and Ground Movement Operation, 3/81; Altitude Restricted Low Approach, 3/128.

3-84 ILS CRITICAL AREAS

If an ILS critical area is marked and identifiable, restrict aircraft and surface vehicle operations, and provide information as follows when the ILS is being used for approach/landing guidance.

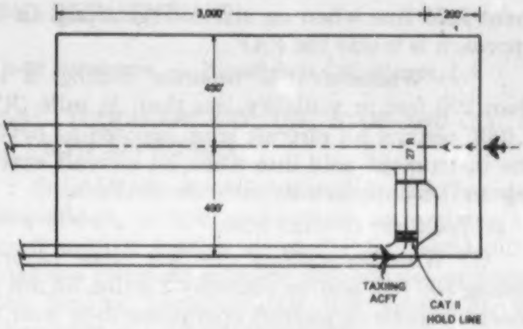
3-84 Note 1. — Restrictions to the operation of aircraft and vehicles are required to assure the integrity of ILS course signals and to meet obstacle clearance needs. Airport operators are responsible for installing and maintaining appropriate signs and markings delineating taxi lanes, hold lines, and no parking areas associated with ILS critical areas.

3-84 Note 2. — At USAF bases, the critical areas and the obstacle critical area (touchdown area) will be protected by an instrument hold line. An instrument hold line is marked only when a restriction short of the runway is necessary. See AFR 60-5 for the dimensions of the critical areas and the obstacle critical areas (touchdown areas).

3-84 NOTE 3. — For holding purposes, no point on the longitudinal axis of the aircraft is permitted past the hold line.

a. Obstacle Critical Area — A rectangular obstacle critical area surrounds the approach end of each Category II and Category III ILS runway. When conditions are reported ceiling less than 200 feet and/or RVR 2,000 or less *(USAF:* ½ mile if no RVR), do not authorize vehicles/aircraft to be in the area when an aircraft conducting an approach/missed approach enters/is over the area.

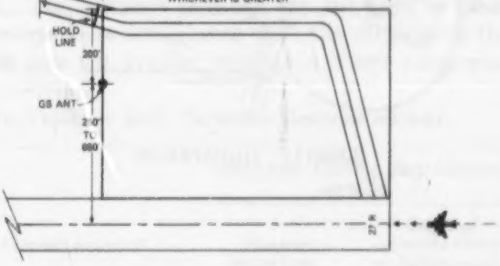
3-84a Note. — *USAF:* A rectangular obstacle critical area surrounds the approach end of each Category II/III ILS or PAR (with HAT below 200 feet) runway.



3-84a(1) Illustration

b. Glide Slope Critical Area —

(1) *USAF NOT APPLICABLE.* When conditions are less than reported ceiling 800 feet and/or visibility 2 miles, do not authorize vehicles/aircraft to operate in the area when an arriving aircraft is inside the ILS FAF unless that aircraft has reported the airport in sight and is circling/sidestepping to land on other than the ILS runway.



3-84b(1) Illustration

3-84b(1) Note. — The glide slope critical area extends to the near edge of the runway that the ILS serves. It does not include the runway.

3-84b(1) Reference. — Order 6750.16.

(2) *USAF:* The following glide slope critical area procedures apply to CAT I and II ILS systems. See AFR 60-5 for the glide slope critical area dimensions.

(a) Whenever the reported ceiling is at or above 800 feet and visibility at or above 2 miles, permit all aircraft to proceed to the runway hold line.

(b) Whenever the reported ceiling is less than 800 feet or visibility less than 2 miles, but at or above 200 feet or visibility at or above ½ mile (RVR 2,400), restrict all aircraft larger than fighter type/size from proceeding beyond the instru-

ment hold line when an aircraft executing an ILS approach is inside the FAF.

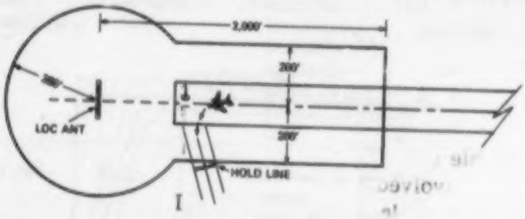
(c) Whenever the reported ceiling is less than 200 feet or visibility less than ½ mile (RVR 2,400), restrict all aircraft from proceeding beyond the instrument hold line when an aircraft executing an ILS approach is inside the FAF.

c. Localizer Critical Area —

(1) When conditions are less than reported ceiling 800 feet and/or visibility 2 miles, do not authorize vehicle or aircraft operations in or over the area when an arriving aircraft is between the ILS FAF and the airport, except:

(a) A preceding arriving aircraft on the same or another runway that passes over or through the area while landing or exiting the runway.

(b) A preceding departing aircraft or missed approach on the same or another runway that passes through or over the area.



3-84c(1) Illustration

(2) In addition to (1) above, when conditions are reported ceiling less than 200 feet and/or RVR 2,000 or less *(USAF:* ½ mile if no RVR), do not authorize vehicle or aircraft operations in or over the area when an arriving aircraft is inside the ILS MM *(USAF:* 1 NM from TD if no MM).

d. Glide Slope/Localizer Critical Area Advisories — When conditions are such that vehicle/aircraft restrictions in/over the areas are not required and an arriving aircraft advises the tower it will operate "Coupled" or "Autoland" or uses a similar phrase, promptly issue an advisory if a vehicle/aircraft will be in/over an area when the arriving aircraft is inside the ILS MM (*USAF:* 1 NM from TD if no MM).

Phraseology:

LOCALIZER/GLIDE SLOPE SIGNAL NOT PROTECTED.

3-85 thru 3-89 RESERVED

Section 8. SPACING AND SEQUENCING

3-90 SEQUENCE/SPACING APPLICATION

Establish the sequence of arriving and departing aircraft by requiring them to adjust flight or ground operation as necessary to achieve proper spacing.

Phraseology:

CLEARED FOR TAKEOFF.

CLEARED FOR IMMEDIATE TAKEOFF.

CLEARED FOR IMMEDIATE TAKEOFF OR HOLD SHORT (traffic).

CLEARED FOR IMMEDIATE TAKEOFF OR TAXI OFF THE RUNWAY.

EXTEND DOWNWIND.

MAKE SHORT APPROACH.

USAF/USN: "MAKE SHORT APPROACH" (not applicable to USAF/USN fighter type aircraft.)

NUMBER (landing sequence number).

FOLLOW (description and location of traffic) *or, if traffic is utilizing another runway,* TRAFFIC IS (description and location) LANDING RUNWAY (number of runway being used).

CIRCLE THE AIRPORT

MAKE LEFT/RIGHT THREE-SIXTY/TWO SEVENTY.

GO AROUND.

CLEARED TO LAND.

CLEARED FOR:

TOUCH-AND-GO

or

STOP-AND-GO

or

LOW APPROACH

CLEARED FOR THE OPTION.

or

OPTION APPROVED

or

UNABLE OPTION, MAKE (specific type of approach/full stop landing)

or

UNABLE (type of option), OTHER OPTIONS APPROVED.

3-90 Note. — The "Cleared for the Option" procedure will permit an instructor pilot/flight examiner/pilot the option to make a touch-and-go, low approach, missed approach, stop-and-go, or full stop landing. This procedure will only be used at those locations with an operational control tower and will be subject to ATC approval

3-90 Reference. — Expeditious Compliance, 2-5.

3-91 TOUCH-AND-GO OR STOP-AND-GO OR LOW APPROACH

Consider an aircraft cleared for touch-and-go, stop-and-go, or low approach as an arriving aircraft until it touches down (for touch-and-go), or makes a complete stop (for stop-and-go), or crosses the landing threshold (for low approach), and thereafter as a departing aircraft.

3-92 SIMULTANEOUS SAME DIRECTION OPERATION

Authorize simultaneous, same direction operations on parallel runways, on parallel landing strips, or on a runway and a parallel landing strip only when the following conditions are met:

a. Operations are conducted in VFR conditions unless visual separation is applied.

b. Two-way radio communication is maintained with the aircraft involved and pertinent traffic information is issued.

c. The distance between the runways or landing strips is in accordance with the minima in the Table (use the greater minimum if two categories are involved).

3-92c. Table. — Same Direction Distance Minima

Aircraft category	*Minimum distance (feet) between parallel*	
	Runway centerlines	*Edges of adjacent strips or runway and strip*
Lightweight, single-engine, propeller-driven	300	200
Twin-engine, propeller-driven	500	400
All others	700	600

3-93 SIMULTANEOUS OPPOSITE DIRECTION OPERATION

Authorize simultaneous opposite direction operations on parallel runways, on parallel landing strips, or on a runway and a parallel landing strip only when the following conditions are met:

a. Operations are conducted in VFR conditions.

b. Two-way radio communication is maintained with the aircraft involved and pertinent traffic information is issued.

Phraseology:

TRAFFIC (description) LANDING/TAKING OFF/ LOW APPROACH, OPPOSITE DIRECTION ON PARALLEL RUNWAY/LANDING STRIP.

c. The distance between the runways or landing strips is in accordance with the minima in the Table.

3-93c. Table. — Opposite Direction Distance Minima

Time of Operation	*Minimum distance (feet) between parallel*	
	Runway centerlines	*Edges of adjacent strips or runway and strip*
Between sunrise and sunset	1,400	1,400
Between sunset and sunrise	2,800	Not authorized

WAKE TURBULENCE APPLICATION

d. Separate a Category I or II aircraft behind a nonheavy Category III aircraft taking off or making a low/missed approach when utilizing opposite direction takeoffs on the same runway by *3 minutes* unless a pilot has INITIATED a request to deviate from the *3-minute* interval. In the latter case, issue a wake turbulence advisory before clearing the aircraft for takeoff.

3-93d Note. — A request for takeoff does not initiate a waiver request; the request for takeoff must be accompanied by a request to deviate from the *3-minute* rule.

3-93d Reference. — Aircraft Categories, 106 Note 3/a.

e. Separate aircraft behind a heavy jet departing or making a low/missed approach when utilizing opposite direction takeoffs or landing on the same or parallel runways separated by less than 2,500 feet — *3 minutes.*

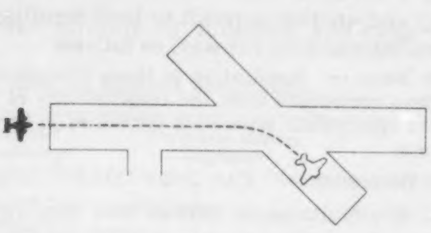
f. Inform an aircraft when it is necessary to hold in order to provide the required *3-minute* interval.

Phraseology:

HOLD FOR WAKE TURBULENCE.

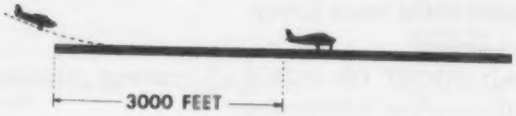
3-94 thru 3-99 RESERVED

need not be clear of the runway if the following minimum distance from the landing threshold exists:



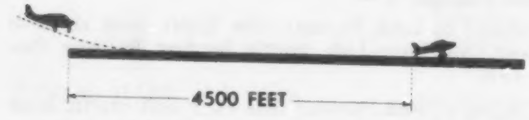
3-122a(1). Illustration

(a) When a Category I aircraft is landing behind a Category I or II — *3,000 feet.*



3-122a(1)(a) Illustration

(b) When a Category II aircraft is landing behind a Category I or II — *4,500 feet.*



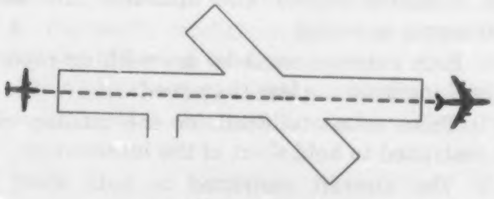
3-122a(1)(b) Illustration

(2) The other aircraft has departed and crossed the runway end. If you can determine distances by reference to suitable landmarks and the other aircraft is airborne, it need not have crossed the runway end if the following minimum distance from the landing threshold exists:

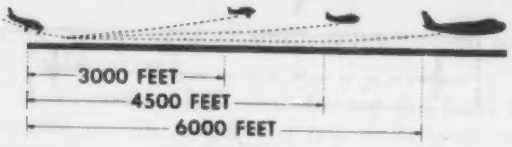
(a) Category I aircraft landing behind Category I or II — *3,000 feet.*

(b) Category II aircraft landing behind Category I or II — *4,500 feet.*

(c) When either is a category III aircraft — *6,000 feet.*



3-122a(2) Illustration 1



3-122a(2) Illustration 2

WAKE TURBULENCE APPLICATION

b. Issue wake turbulence cautionary advisories and the position, altitude if known, and direction of flight of the heavy jets to aircraft landing behind a departing/arriving heavy jet on the same or parallel runways separated by less than 2,500 feet.

3-122b Reference. — AC 90-23D, Pilot Responsibility, paragraph 12.

3-122b Example 1. —

"Cleared to land Runway Two Seven Left, caution wake turbulence, heavy Boeing 747 departing Runway Two Seven Right."

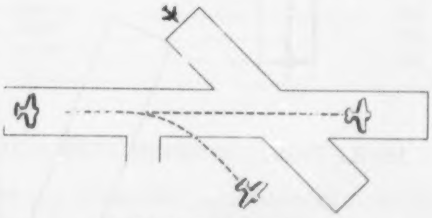
3-122b Example 2. —

"Number two to land, following a heavy Lockheed C5A on two-mile final. Caution wake turbulence."

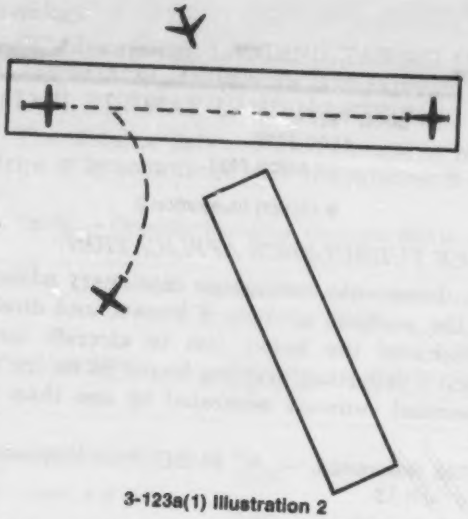
3-123 INTERSECTING RUNWAY SEPARATION

a. Separate an arriving aircraft using one runway from another aircraft using an intersecting runway or a nonintersecting runway when the flight paths intersect by ensuring that the arriving aircraft does not cross the landing threshold or flight path of the other aircraft until one of the following conditions exists:

(1) The preceding aircraft has departed and passed the intersection/flight path or is airborne and turning to avert any conflict.

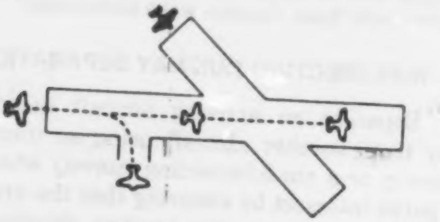


3-123a(1) Illustration 1

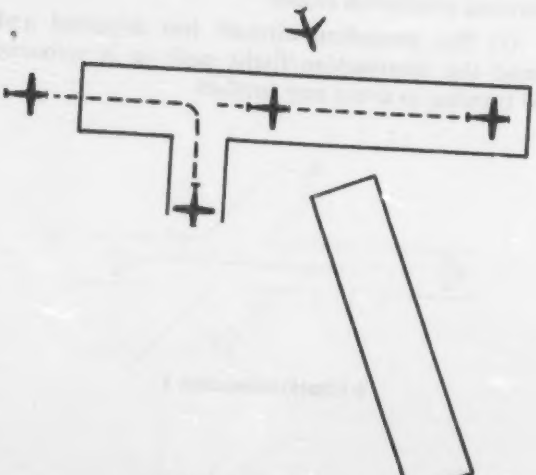


3-123a(1) Illustration 2

(2) A preceding arriving aircraft has taxied off the landing airway, completed landing roll and will hold short of the intersection/flight path, or has passed the intersection/flight path.



3-123a(2) Illustration 1



3-123a(2) Illustration 2

b. *USAF/USN NOT APPLICABLE.* Where approved by the air traffic manager and in accordance with a facility directive, you may authorize an aircraft to takeoff from one runway and another aircraft to land simultaneously on an intersecting runway or an aircraft to land on one runway and another aircraft to land simultaneously on an intersecting runway, as follows:

3-123b Note. — Application of these procedures does not relieve controllers from the responsibility of providing other appropriate separation contained in this handbook.

3-123b Reference. — FAA Order 7210.3 — 1226.

(1) A simultaneous takeoff and landing operation may be conducted only in VFR conditions between sunrise and sunset.

(2) Instruct the landing aircraft to hold short of the intersecting runway being used by the aircraft taking off. In the case of simultaneous landings and no operational benefit is lost, restrict the aircraft in the lesser Group.

Phraseology:

HOLD SHORT OF RUNWAY (runway number), (traffic or other information).

3-123b(2) Note. — Pilots who prefer to use the full length of the runway or a runway different from that specified are expected to advise ATC prior to landing.

(3) Issue traffic information to both aircraft involved and obtain an acknowledgement from each.

3-123b Example 1. —

"Cleared to land Runway One Eight, hold short of Runway One Four Left, traffic landing Runway One Four Left."

"Cleared to land Runway One Four Left, traffic landing Runway One Eight will hold short of the intersection."

3-123b Example 2. —

"Cleared to land Runway Three Six, hold short of Runway Three Three, traffic departing Runmway Three Three."

"Traffic landing Runway Three Six will hold short of the inersection, cleared for takeoff."

(4) If requested by either aircraft, issue the measured distance from the landing threshold to the intersection.

3-123b(4) Example. —

"Distance from the landing threshold of Runway One Eight to the intersection of Runway One Four Left is six thousand feet."

(5) The conditions in (2), (3), and (4) shall be met in sufficient time for the pilots to take other action if desired and no later than the time landing clearance is issued.

(6) Both runways must be dry with no reports that braking action is less than good.

(7) There is no tailwind for the landing aircraft restricted to hold short of the intersection.

(8) The aircraft restricted to hold short is listed in Appendix B.

Section 5. ALTITUDE ASSIGNMENT AND VERIFICATION

4-40 FLIGHT DIRECTION

Clear aircraft at altitudes according to the Table.

4-40 Table. — Altitude Assignment

Aircraft Operating	*On course degrees magnetic*	*Assign*
Below 3,000 feet above surface	Any course	Any altitude
Below FL 290	0 through 179	Odd cardinal altitudes or flight levels at intervals of 2,000 feet
	180 through 359	Even cardinal altitudes or flight levels at intervals of 2,000 feet
At or above FL 290	0 through 179	Odd cardinal flight levels at intervals of 4,000 feet beginning with FL 290
	180 through 359	Odd cardinal flight levels at intervals of 4,000 feet beginning with FL 310
Within an ALTRV	Any course	Any altitude or flight level

4-40 Examples. —

3,000, 5,000, FL 250, FL 270.

4,000, 6,000, FL 240, FL 260.

FL 290, FL 330, FL 370.

FL 310, FL 350, FL 390.

4-41 EXCEPTIONS

When traffic, meteorological conditions, or aircraft operational limitations prevent assignment of altitudes prescribed in paragraph 4-40, assign any cardinal altitude or flight level below FL 290 or any odd cardinal flight level at or above FL 290 without regard to direction of flight as follows:

4-41 Note. — See 2-59 for control abbreviations and symbols to be used in conjunction with this paragraph.

a. For traffic conditions, take this action only if one of the following conditions exists:

(1) Aircraft remain within a facility's area and prior approval is obtained from other affected positions or sectors or the operations are covered in a Facility Directive.

(2) Aircraft will proceed beyond the facility's area and specific operations and procedures permitting random altitude assignment are covered in a letter of agreement between the appropriate facilities.

(3) Military aircraft are operating on random routes and prior approval is obtained from the facility concerned.

b. For meteorological conditions, take this action only if you obtain prior approval from other affected positions or sectors within your facility and, if necessary, from the adjacent facility concerned.

c. For aircraft operational limitations, take this action only if the pilot informs you the available appropriate altitude exceeds the operational limitations of his aircraft and only after you obtain prior approval from other affected positions or sectors within your facility and, if necessary, from the adjacent facility concerned.

d. For mission requirements, take this action only when the aircraft is operating on an MTR.

4-42 LOWEST USABLE FLIGHT LEVEL

If a change in atmospheric pressure affects a usable flight level in your area of jurisdiction, use the Table to determine the lowest usable flight level to clear aircraft at or above 18,000 feet msl.

4-42 Table. — Lowest Usable FL

Altimeter Setting	*Lowest Usable FL*
29.92" or higher	180
29.91" to 28.92"	190
28.91" to 27.92"	200

4-43 ADJUSTED MINIMUM FLIGHT LEVEL

When the prescribed minimum altitude for IFR operations is at or above 18,000 feet MSL, and the atmospheric pressure is less than 29.92", add the appropriate adjustment factor from the Table to the flight level equivalent of the minimum altitude in feet to determine the adjusted minimum flight level.

4-43 Table. — Minimum FL Adjustment

Altimeter Setting	*Adjustment Factor*
29.92" or higher	None
29.91" to 29.42"	500 feet
29.41" to 28.92"	1,000 feet
28.91" to 28.42"	1,500 feet
28.41" to 27.92"	2,000 feet

4-44 MINIMUM EN ROUTE ALTITUDES

Except as provided in **a** and **b** below, assign altitudes at or above the MEA for the route segment being flown. When a lower MEA for subsequent segments of the route is applicable, issue the lower MEA only after the aircraft is over or past the Fix/NAVAID beyond which the lower MEA applies unless a crossing restriction at or above the higher MEA is issued.

a. An aircraft may be cleared below the MEA but not below the MOCA for the route segment being flown if the altitude assigned is at least 300 feet above the floor of controlled airspace and one of the following conditions are met:

4-44a Note. — Controllers must be aware that in the event of radio communications failure, a pilot will climb to the MEA for the route segment being flown.

(1) Nonradar procedures are used only within 22 miles of a VOR, VORTAC, or TACAN.

(2) Radar procedures are used only when an operational advantage is realized and the following actions are taken:

(a) Radar navigational guidance is provided until the aircraft is within 22 miles of the NAVAID, and

(b) Lost communications instructions are issued.

b. An aircraft may be cleared to operate on jet routes below the MEA (but not below the prescribed minimum altitude for IFR operations) or above the maximum authorized altitude if, in either case, radar service is provided.

4-44b Note. — Minimum en route and maximum authorized altitudes for certain jet route segments have been established above the floor of the jet route structure due to limitations on navigational signal coverage.

c. Where a higher altitude is required because of an MEA, the aircraft shall be cleared to begin climb to the higher MEA as follows:

(1) If no MCA is specified, prior to or immediately after passing the fix where the higher MEA is designated.

(2) If a MCA is specified, prior to the fix so as to cross the fix at or above the MCA.

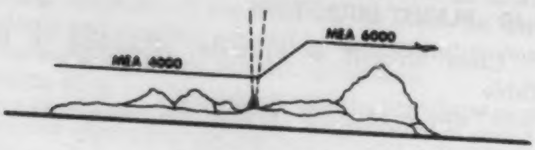


ILLUSTRATION 1.

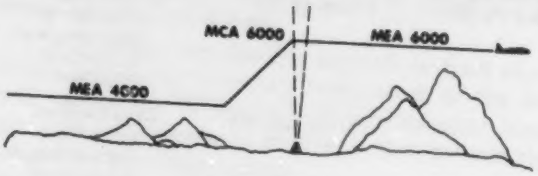


ILLUSTRATION 2.

d. Where MEA's have not been established, clear an aircraft at or above the minimum altitude for IFR operations prescribed by FAR 91.119.

4-45 ALTITUDE INFORMATION

When issuing altitude information, include the following items, as appropriate:

4-45 Reference. — Clearance Items, 4-10.

a. Altitude to maintain or cruise. When issuing cruise in conjunction with an airport clearance limit and an unpublished route will be used, issue an appropriate crossing altitude to ensure terrain clearance until the aircraft reaches a fix, point, or route where the altitude information is available to the pilot. When issuing a cruise clearance to an airport which does not have a published instrument approach, a cruise clearance without a crossing restriction may be issued.

Phraseology:

MAINTAIN/CRUISE (altitude). MAINTAIN (altitude) UNTIL (time), or PAST (fix), or (number of miles or minutes) MILES/MINUTES PAST (fix).

CROSS (fix, point) or INTERCEPT (route) AT OR ABOVE (altitude), CRUISE (altitude).

4-45a Note 1. — The crossing altitude must assure IFR obstruction clearance to the point where the aircraft is established on a segment of a published route or instrument approach procedure.

4-45a Note 2. — When an aircraft is issued a cruise clearance to an airport which does not have a published instrument approach procedure, it is not possible to satisfy the requirement for a crossing altitude that will ensure terrain clearance until the aircraft reaches a fix, point, or route where altitude information is available to the pilot. Under those conditions, a cruise clearance without a crossing restriction authorizes a pilot to determine the minimum IFR altitude as prescribed in FAR

4-56 UNMONITORED NAVAIDS

Separate an aircraft holding at a fan marker or an unmonitored NAVAID from any other aircraft occupying the course which the holding aircraft will follow if it does not receive signals from the marker or NAVAID.

4-57 ILS PROTECTION/CRITICAL AREAS

When conditions are less than reported ceiling 800 feet and/or visibility 2 miles, do not authorize aircraft to hold below 5,000 feet inbound toward the airport on or within 1 statute mile of the localizer between the ILS FAF and the airport. *USAF:* Holding restriction applies only when an arriving aircraft is between the ILS FAF and the runway.

4-57a Reference. — Order 7130.3, paragraph 54 and Figure 20.

4-58 thru 4-59 RESERVED

Section 7. ARRIVAL PROCEDURES

4-60 CLEARANCE INFORMATION

Clear an arriving aircraft to a clearance limit by specifying the following:

a. Name of fix or airport.

b. Route of flight including a STAR and STAR Transition, if appropriate. Assign a STAR and STAR Transition to any civil aircraft in lieu of other routes; e.g., airways or Preferential Arrival Routes, when the routings are the same. The clearance shall include the name, the current number and the transition, if necessary, of the STAR to be flown. Assign a STAR to military aircraft only when a STAR is filed or requested by the pilot.

Phraseology:

(STAR name and number) ARRIVAL.

(STAR name and number) ARRIVAL, (transition name) TRANSITION.

4-60b Examples. —

"Rosewood One Arrival."

"Rosewood One Arrival, Delta Transition."

4-60b Note. — If a civil pilot does not wish to use a STAR issued in an ATC clearance or any other STAR published for that location, he is expected to advise ATC.

c. Assigned altitude if different from present altitude or when a STAR/STAR Transition is issued.

4-60c Example. —

Bayview Three RNAV Arrival, Helen Transition, maintain flight level three three zero."

d. Issue holding instructions, EFC, and additional delay information as required.

e. Instructions regarding further communications as appropriate.

4-60e Reference. — Radio Communications Transfer, 2-17.

4-61 ADVANCE DESCENT CLEARANCE

EN ROUTE

Take the following action when exercising control of aircraft landing at an airport located in an adjacent center's control area near the common boundary:

a. Coordinate with the receiving facility for a lower altitude and issue a clearance to the aircraft as appropriate.

b. Initiate this action at a distance sufficient from destination to allow for normal descent and speed reduction.

4-62 SINGLE FREQUENCY APPROACHES (SFA)

TERMINAL

Where SFA procedures for military single-piloted turbojet aircraft on an IFR flight plan are contained in a letter of agreement, do not require a radio frequency change after the aircraft begins approach, or after initial contact during an en route descent, until a landing or low approach has been completed, except under the following conditions:

4-62 Reference. — Order 7610.4-1566, Single Frequency Approach. Glossary (Single-piloted aircraft).

a. During daylight hours while the aircraft is in VFR conditions.

b. On pilot request.

c. When pilot cancels IFR flight plan.

d. In an emergency situation.

e. When aircraft is cleared for visual approach.

4-63 RADIO FREQUENCY AND RADAR BEACON CHANGES FOR MILITARY AIRCRAFT

When military single-piloted turbojet aircraft will conduct an approach wholly or partly in IFR conditions or at night, take the following action:

4-63 Note. — It is known that the mental distraction and the inadvertent movement of aircraft controls resulting from the pilot's turning, reaching, or leaning to change frequencies can induce spatial disorientation (vertigo).

a. Avoid radio frequency and radar beacon changes to the maximum extent that communications capabilities and traffic will permit. However, when changes are required:

(1) Give instructions early enough to allow the change before the aircraft reaches the approach fix or handoff point.

(2) Keep frequency/radar beacon changes to a minimum below 2,500 feet above the surface.

(3) Avoid requiring frequency/radar beacon changes during the time the aircraft is making a turn.

b. When traffic volume requires, a frequency other than the one used by aircraft making approaches may be assigned for use in transferring control to the approach control facility.

TERMINAL

c. If practicable, use a frequency common to both the GCA unit and approach control to minimize frequency changes.

d. When a GCA unit is not able to communicate on a common frequency, a change to a GCA frequency may be authorized.

e. When a nonradar approach will be made, aircraft may be instructed to change to tower frequency when:

(1) The reported ceiling is at or above 1,500 feet and visibility is 5 statute miles or more.

(2) The aircraft reports able to proceed by visual reference to the surface.

(3) The aircraft request and is cleared for a contact approach.

(4) The aircraft is cleared for a visual approach.

f. Avoid making frequency/radar beacon changes after an aircraft begins a high altitude approach.

g. In the event of a missed approach, do not require a frequency/radar beacon change before the aircraft reaches the missed approach altitude, MEA, or MVA.

4-64 MILITARY TURBOJET EN ROUTE DESCENT

Provide military turbojet aircraft the same arrival procedures that are provided for nonmilitary turbojet aircraft except:

4-64 Note. — It is the responsibility of the pilot to request a high altitude approach if he does not want normal arrival handling.

a. An en route descent may be used in a nonradar environment; however, radar capability should exist which will permit the aircraft to be vectored to the final approach course of a published high altitude instrument approach procedure or PAR/ASR approach. Do not use this procedure if other than normal vectoring delays are anticipated.

b. Prior to issuance of a descent clearance below the highest initial approach fix altitude established for any high altitude instrument approach procedure for the destination airport inform the aircraft:

(1) Type of approach to expect.

4-64b(1) Example. —

"Expect V-O-R approach to runway three two."

(2) Radar vectors will be provided to the final approach course.

4-64b(2) Example. —

"Expect surveillance/precision approach to Runway One Seven; radar vectors to final approach course."

(3) Current weather whenever the ceiling is below 1,000 feet *(USAF:* 1,500 feet) or the highest circling minimum whichever is greater, or when the visibility is less than 3 miles.

4-64b(3) Example. —

"Expect ILS approach to Runway Eight; radar vectors to localizer course. Weather (reported weather)."

c. If ATIS is provided and the pilot advises he has received the current ATIS broadcast before the descent clearance in b. is issued, omit those items in b. that are contained in the broadcast.

d. To avoid requiring an aircraft to fly at low altitudes for an excessive distance, descent clearance should be issued at a point determined by adding 10 to the first two digits of the flight level.

4-64d Example. —

For FL 370, 3710=47 miles.

4-64d Note. — Turbojet en route descents are based on a rate of descent of 4,000 to 6,000 feet per minute.

e. Do not terminate the en route descent of an aircraft without the consent of the pilot except as required by radar outage or an emergency situation.

4-65 ADVANCE APPROACH INFORMATION

When an aircraft intends to land at an airport where approach control services are provided and two or more instrument approach procedures are published, the facility controlling the aircraft immediately before entry into the approach control area shall inform the aircraft of the type of approach to expect or that it will be vectored to the airport. Omit this information if ATIS is provided for the airport or if visibility is 3 miles or better and the ceiling is at or above the highest initial approach altitude established for any low altitude instrument approach procedure for the airport.

Phraseology:

EXPECT (type) APPROACH.

EXPECT VISUAL APPROACH.

4-66 ARRIVAL INFORMATION

EN ROUTE

a. Forward the following information to nonapproach control towers soon enough to permit adjustment of the traffic flow or to FSS's soon enough to provide airport advisory service:

(1) Aircraft identification.

(2) Type of aircraft.

(3) ETA.

(4) Type of instrument approach procedure the aircraft will execute.

4-66a Note. — Specific time requirements are usually stated in a Letter of Agreement.

b. Forward the following information to approach control facilities before transfer of control jurisdiction:

4-66b Note. — Transfer points are usually specified in a Letter of Agreement.

(1) Aircraft identification.

(2) Type of aircraft and appropriate suffix, if transponder, DME or TACAN-only equipped.

(3) ETA or actual time, and proposed or actual altitude over clearance limit. The ETA need not be given if the arrival information is being forwarded during a radar handoff.

(4) Clearance limit (when other than the destination airport) and EFC issued to the aircraft. Clearance limit may be omitted when provided for in a letter of agreement.

(5) Time, fix, or altitude when control responsibility is transferred to the approach control facility. This information may be omitted when provided for in a letter of agreement.

Phraseology:

(Identification), (type of aircraft), ESTIMATED/OVER (clearance limit, (time), (altitude), EFC (time).

If required,

YOUR CONTROL,

or

YOUR CONTROL AT (time, fix or altitude).

4-67 WEATHER INFORMATION

EN ROUTE

When an available official weather report indicates weather conditions are below a 1,000-foot *(USAF:* 1,500-foot) ceiling or below the highest circling minimum, whichever is higher, or less than three-miles visibility for the airport concerned, transmit the weather report and changes classified as special weather observations to an arriving aircraft prior to or as part of the approach clearance when:

a. It is transmitted directly to the pilot via center controller-to-pilot communications.

b. It is relayed through a communications station other than an air carrier company radio or through a nonapproach control facility. You may do this by telling the station or non-approach control facility to issue current weather.

4-68 BELOW MINIMA REPORT BY PILOT

If an arriving aircraft reports weather conditions are below his landing minima:

4-68 Note. — Determination that existing weather/visibility is adequate for approach/landing is the responsibility of the pilot/aircraft operator.

a. Issue appropriate instructions to the aircraft to hold or proceed to another airport.

b. Adjust, as necessary, the position in the landing sequence of any other aircraft desiring to make approaches and issue approach clearances accordingly.

4-69 TRANSFER OF JURISDICTION

Transfer radio communications and control responsibility early enough to allow the receiving facility to clear an aircraft beyond the clearance limit before the aircraft reaches it.

4-70 AIRPORT CONDITIONS

a. *EN ROUTE:* Before issuing an approach clearance or en route descent, and subsequently as changes occur, inform an aircraft of any abnormal operation of approach and landing aids and of destination airport conditions that you know of which might restrict an approach or landing.

b. *TERMINAL:* On first contact or as soon as possible thereafter, and subsequently as changes occur, inform an aircraft of any abnormal operation of approach and landing aids and of destination airport conditions that you know of which might restrict an approach or landing. This information may be omitted if it is contained in the ATIS broadcast and the pilot states the appropriate ATIS code.

4-70b Reference. — Airport Conditions, Chapter 3, Section 3.

c. *TERMINAL:* Where RCR's are provided, transmit this information to USAF and ANG aircraft in accordance with one of the following. Issue the RCR to other aircraft upon pilot request.

(1) Before or when an approach clearance is issued.

(2) Before an en route descent clearance is issued.

(3) Prior to departure.

(4) As soon as possible after receipt of any subsequent changes in previously issued RCR information.

4-70c Note 1. — USAF has established RCR procedures for determining the average deceleration readings of runways under conditions of water, slush, ice, or snow. The use of RCR code is dependent upon the pilot having a "stopping capability chart" specifically applicable to his aircraft.

4-70c Note 2. — USAF offices furnish RCR information at airports serving USAF and ANG aircraft.

4-70c Reference. — Landing Area Conditions, 3-30.

4-71 ARRIVAL INFORMATION BY APPROACH CONTROL FACILITIES

TERMINAL

a. Forward the following information to nonapproach control towers soon enough to permit adjustment of the traffic flow or to FSSs soon enough to provide airport advisory service:

(1) Aircraft identification.

(2) Type of aircraft.

(3) ETA.

(4) Type of instrument approach procedure the aircraft will execute.

4-71a Note. — Specific time requirements are usually stated in a letter of agreement.

b. Forward the following information to the tower when the tower and TRACON are part of the same facility:

(1) Aircraft identification.

(2) Type aircraft, if required for separation purposes.

(3) Type of instrument approach procedure and/or runway, if differing from that in use.

4-71b Note. — The local controller has the responsibility to determine whether or not conditions are adequate for the use of ARTS data on the BRITE where a facility directive authorizes its use for the transfer of arrival data.

4-71b Reference. — Note 7210.3-1323, Use of ARTS Modify and Quick Look Functions.

c. Where the collocated or satellite tower has ARTS data displayed on its BRITE, the ARTS modify or quick look functions may be used to forward arrival data provided that a Facility Directive at the collocated tower, or a letter of agreement with the satellite tower, exists which outlines procedures for using ARTS for transferring this data.

d. Forward the following information to centers:

(1) Where two or more instrument approach procedures are published for the airport, the particular procedure which an aircraft can expect or that it will be vectored toward the airport for a visual approach.

(2) Highest altitude being used by the approach control facility at the holding fix.

(3) Average time interval between successive approaches.

(4) Arrival time of aircraft over the holding fix or, if control has been transferred to you before an aircraft has reached the fix, a statement or other indication acknowledging receipt of control responsibility.

(5) Revised EFC if different by 10 minutes or more from that issued by the center.

(6) Missed approaches if they affect center operations.

(7) Information relating to an unreported or overdue aircraft.

4-72 APPROACH INFORMATION BY APPROACH CONTROL FACILITIES

TERMINAL

a. Provide current approach information to arriving aircraft on first radio contact or as soon as possible thereafter. Approach information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS code; otherwise, issue approach information by including the following:

(1) Approach clearance or type approach to be expected if two or more approaches are published and the clearance limit does not indicate which will be used.

4-72a(1) Reference. — Advance Approach Information, 4-65

(2) Runway, if different from that to which the instrument approach is made.

(3) Surface wind.

(4) Ceiling and visibility if the ceiling at the airport of intended landing is reported below 1,000 feet *(USAF:* 1,500 feet) or below the highest circling minimum, whichever is greater, or the visibility is less than 3 miles.

(5) Altimeter setting for the airport of intended landing.

4-72a(5) Reference. — Altimeter Settings, Chapter 2, Section 7.

b. Issue any known changes classified as special weather observations as soon as possible. Special weather observations need not be issued after they are included in the ATIS broadcast and the pilot states the appropriate ATIS code.

c. Advise pilots when the ILS on the runway in use is not operational if that ILS is on the same frequency as an operational ILS serving another runway.

4-72c Example. —

"Expect Visual Approach Runway Two Five Right, Runway Two Five Right I-L-S not operational."

4-72c Reference. — FAR 91.87(d)(2).

4-73 SWITCHING ILS RUNWAYS

TERMINAL, USAF NOT APPLICABLE

When a change is made from one instrument landing system (ILS) to another at airports equipped with multiple systems which are not used simultaneously, do the following:

a. Coordinate with facilities which use fixes formed by reference to these ILS courses.

b. Broadcast on an appropriate frequency that a change is to be made.

Phraseology:

ATTENTION, I-L-S RUNWAY (runway number) WILL BE CHANGED TO I-L-S RUNWAY (runway number) ON (frequency) AT (time).

c. After the change is made, broadcast that it has been done.

Phraseology:

ATTENTION, I-L-S RUNWAY (runway number) ON (frequency) NOW IN OPERATION.

4-74 thru 4-79 RESERVED

5-76 ADJACENT AIRSPACE

a. If coordination between the controllers concerned has not been effected, separate radar-controlled aircraft from the boundary of adjacent airspace in which radar separation is also being used by the following minima:

5-76a Reference. — Coordinate Use of Airspace, 2-14.

(1) When less than 40 miles from the antenna — *1 ½ miles.*

(2) When 40 miles or more from the antenna — *2 ½ miles.*

(3) En Route Stage A/DARC:

(a) Below Flight Level 600 — *2 ½ miles.*

(b) Flight Level 600 and above — *5 miles.*

b. Separate radar-controlled aircraft from the boundary of airspace in which nonradar separation is being used by the following minima:

(1) When less than 40 miles from the antenna — *3 miles.*

(2) When 40 miles or more from the antenna — *5 miles.*

(3) En Route Stage A/DARC:

(a) Below Flight Level 600 — *5 miles.*

(b) Flight Level 600 and above — *10 miles.*

5-77 EDGE OF SCOPE

Separate a radar-controlled aircraft climbing or descending through the altitude of an aircraft that has been tracked to the edge of the scope/display by the following minima until nonradar separation has been established:

a. When less than 40 miles from the antenna — *3 miles* from edge of scope.

b. When 40 miles or more from the antenna — *5 miles* from edge of scope.

c. En Route Stage A/DARC:

(1) Below Flight Level 600 — *5 miles.*

(2) Flight Level 600 and above — *10 miles.*

5-78 BEACON TARGET DISPLACEMENT

When using a radar target display with a previously specified beacon target displacement to separate a beacon target from a primary target, adjacent airspace, obstructions, or terrain, add a 1-mile correction factor to the applicable minima.

5-78 Note. — The maximum allowable beacon target displacement which may be specified by the facility air traffic manager is 1/2 mile.

5-78 Reference. — Order 7210.3 — 373, Monitoring of Mode 3/A Radar Beacon Codes.

5-79 GPA 102/103 CORRECTION FACTOR

When using a radar display whose primary radar video is processed by the GPA 102/103 modification to a joint-use radar system, apply the following correction factors to the applicable minima:

a. If less than 40 miles from the antenna — add *1 mile.*

b. If 40 miles or more, but not over 200 miles, from the antenna — add *3 miles.*

5-80 thru 5-89 RESERVED

Section 6. VECTORING

5-90 APPLICATION

Vector aircraft:

a. In controlled airspace for separation, safety, noise abatement, operational advantage, or when a pilot requests. Allow aircraft operating on an RNAV route to remain on their own navigation to the extent possible.

b. In uncontrolled airspace only upon pilot request and as an additional service.

c. At or above MVA or the minimum IFR altitude except as authorized for missed approaches, radar approaches, departures, Special VFR and VFR operations.

5-90c Note. — VFR aircraft not at an altitude assigned by ATC may be vectored at any altitude. It is the responsibility of the pilot to comply with the applicable FARs.

5-90c References. — Minimum Enroute Altitudes, 4-44; Priority, 7-41; Altitude Assignment, 7-43, 7-94. FAR 91.79, Minimum Safe Altitudes.

d. In airspace for which you have control jurisdiction, unless otherwise coordinated.

e. So as to permit it to resume its own navigation within radar coverage.

f. Operating Special VFR only within control zones.

g. Operating VFR at those locations where a special program is established, or when a pilot requests, or you suggest and the pilot concurs.

5-90g Reference. — Order 7210.3, Chapter 13, Section 1, National Terminal Radar Program.

5-91 METHODS

a. Vector aircraft by specifying:

(1) Direction of turn, if appropriate, and magnetic heading to be flown, or

Phraseology:

TURN LEFT/RIGHT HEADING (degrees).

FLY HEADING (degrees).

FLY PRESENT HEADING.

DEPART (fix) HEADING (degrees).

(2) The number of degrees, in group form, to turn and the direction of turn, or

Phraseology:

TURN (number of degrees) DEGREES LEFT/RIGHT.

(3) For NO-GYRO procedures, the type of vector, direction of turn, and when to stop turn.

Phraseology:

THIS WILL BE A NO-GYRO VECTOR,

TURN LEFT/RIGHT.

STOP TURN.

b. When initiating a vector, advise the pilot of the purpose.

Phraseology:

FOR VECTOR TO (fix or airway).

FOR VECTOR TO INTERCEPT (name of NAVAID) (specified) RADIAL.

VECTOR FOR SPACING.

FOR VECTOR TO FINAL APPROACH COURSE,

or if the pilot does not have knowledge of the type of approach,

FOR VECTOR TO (approach name) FINAL APPROACH COURSE.

c. Issue with the vector an altitude to maintain and all appropriate altitude restrictions when:

(1) The vector will take the aircraft off an assigned procedure which contains altitude instructions, i.e., instrument approach, non-radar SID, etc.

(2) The previously issued clearance included crossing restrictions.

5-91c Reference. — Route or Altitude Amendments, 4-11.

d. If appropriate, advise the pilot what to expect when the vector is completed.

Phraseology:

EXPECT TO RESUME (route, SID, STAR, etc.).

5-91d Note. — You must ensure that the pilot is made aware if he is expected to resume a previously issued route/procedure.

e. Provide radar navigational guidance until the aircraft is:

(1) Established within the airspace to be protected for the nonradar route to be flown, or

(2) On a heading that will, within a reasonable distance, intercept the nonradar route to be flown, and

(3) Informed of its position unless the aircraft is RNAV or DME equipped and being vectored toward a VORTAC/TACAN or Waypoint and within the service volume of the NAVAID.

Phraseology:

(Position with respect to course/fix along route), RESUME OWN NAVIGATION,

or

FLY HEADING (degrees) UNTIL RECEIVING (name) NAVAID/WAYPOINT, THEN PROCEED DIRECT,

or

7-32 CLEARANCE FOR VISUAL APPROACH — RADAR

A radar controlled aircraft may be cleared for a visual approach provided the following conditions are met:

a. Traffic conflicts with other aircraft have been resolved, and

b. An aircraft not following another aircraft on approach reports the airport in sight, or

c. An aircraft reports sighting a preceding aircraft landing on the same runway and has been instructed to follow it, or

d. An aircraft reports the airport but not the preceding aircraft in sight, provided radar separation is maintained or visual separation is provided.

e. The aircraft is and can remain in VFR conditions.

f. Weather conditions at the airport are reported VFR; or at airports without weather reporting service, the pilot has been informed that weather is not available.

g. The tower is informed of the aircraft's position prior to communications transfer.

7-32 Note 1. — If an aircraft is being vectored for an instrument approach and subsequently reports the airport in sight, controllers may initiate a visual approach or pilots may request a visual approach. Under these conditions, the provisions of 7-31a.(1) are not applicable, and a controller's only obligation as it relates to weather is to ensure compliance with 7-32f and to only authorize such operations when weather conditions are clearly not a prohibiting factor.

7-32 Note 2. — ARTS functions may be used to inform the tower if a facility directive or letter of agreement specifies control and communications transfer points.

7-32 Reference. — Airport traffic areas, 2-16; Arrival Information by Approach Control Facilities, 4-71.

7-33 MULTIPLE RUNWAY APPLICATION (VISUAL) — RADAR

a. Parallel runways separated by less than 2,500 feet — Unless standard separation is provided by ATC, an aircraft must report sighting a preceding aircraft making an approach to the same or parallel runway, and all aircraft are informed that approaches are being conducted to the parallel runway. (DO NOT PERMIT A HEAVY AIRCRAFT TO OVERTAKE ANOTHER AIRCRAFT.)

b. Parallel runways separated by at least 2,500 feet but less than 4,300 feet — Headings must be assigned which will permit aircraft to intercept the extended centerline of the runway at an angle not greater than 30 degrees unless standard separation is provided during the turn-on. Once the aircraft are established within 30 degrees of the final, these operations may be conducted simultaneously. All aircraft must be informed that approaches are being conducted to the parallel runway. (DO NOT PERMIT THE RESPECTIVE AIRCRAFTS' PRIMARY RADAR RETURNS TO MERGE UNLESS VISUAL SEPARATION IS BEING APPLIED.)

7-33b Note. — The intent of the 30-degree intercept angle is to reduce the potential for overshoots of the final and to preclude side-by-side operations with one or both aircraft in a "belly-up" configuration during the turn-on. Aircraft performance, speed, and the number of degrees of turn to the final are factors to be considered by the controller when vectoring to parallel runways.

c. Intersecting/converging runways, or parallel runways separated by 4,300 feet or more — These operations may be conducted simultaneously provided standard separation is maintained until the aircraft has received and acknowledged for a visual approach clearance and all aircraft are informed that approaches are being conducted to the other runway. (DO NOT PERMIT THE RESPECTIVE AIRCRAFTS' PRIMARY RADAR RETURNS TO MERGE UNLESS VISUAL SEPARATION IS BEING APPLIED.)

7-33c Note. — Although simultaneous approaches may be conducted to intersecting runways when the conditions in 7-33c are met, staggered approaches may be necessary to meet the airport separation requirements as specified in paragraph 3-124.

7-34 CHARTED VISUAL FLIGHT PROCEDURES (CVFP)

USA/USAF/USN NOT APPLICABLE. Charted visual flight procedures may be used if all the following conditions are met:

a. The approach must be conducted in a radar environment.

b. There must be an operating control tower.

c. Reported weather meets the criteria in 7-31a(1) unless higher minimums are published for the particular CVFP.

d. The published name of the CVFP and the landing runway are specified in the clearance.

7-34d Example. —

"United Six Ten cleared for a Bridge Visual Runway Two Eight Right Approach."

e. An aircraft not following another aircraft on approach reports sighting a charted visual landmark, or

f. An aircraft reports sighting a preceding aircraft landing on the same runway and has been instructed to follow it, or

7-34f Example —

"Republic Four Twelve follow the United heavy Seven Forty-seven. Cleared for a Stadium Visual Runway Two Four Approach. Caution, wake turbulence."

g. When using parallel or intersecting/converging runways, the criteria specified in 7-33 are applied.

7-34 Note. — Altitudes depicted on CVFP's are recommended altitudes only, they are not established for air traffic separation.

7-35 CONTACT APPROACH

Clear an aircraft for a contact approach only if the following conditions are met:

a. The pilot has requested it.

7-35a Note. — This procedure is intended primarily as an alternative for an instrument approach procedure by an aircraft on an IFR flight plan, operating clear of clouds with at least 1 mile flight visibility. When executing a contact approach, the pilot is responsible for maintaining the required flight visibility, cloud clearance, and terrain/obstruction clearance. Unless otherwise restricted, the pilot may find it necessary to descend, climb, and/or fly a circuitous route to the airport to maintain cloud clearance and/or terrain/obstruction clearance. It is not in any way intended that controllers will initiate or suggest a contact approach to a pilot.

b. The reported ground visibility is at least 1 statute mile.

c. Approved separation is applied between aircraft so cleared and other IFR or Special VFR aircraft. When applying vertical separation, do not assign a fixed altitude but clear the aircraft at or below an altitude which is at least 1,000 feet below any IFR traffic but not below the minimum safe altitude prescribed in FAR 91.79.

7-35c Note. — FAR 91.79 specifies the minimum safe altitude to be flown (1) over congested areas, (2) other than congested areas, and (3) anywhere to provide for an emergency landing in the event of power failure and without undue hazard to persons or property on the surface.

d. An alternative clearance is issued when weather conditions are such that a contact approach may be impracticable.

Phraseology:

CLEARED FOR CONTACT APPROACH,

and, if required,

AT OR BELOW (altitude) (routing).

IF NOT POSSIBLE (alternative procedures) AND ADVISE.

7-36 thru 7-39 RESERVED

Section 5. SPECIAL VFR

7-40 AUTHORIZATION

Special VFR (SVFR) operations in weather conditions less than basic VFR minima are authorized at any location not prohibited by FAR 93.113 or when an exemption to FAR 93.113 has been granted and an associated letter of agreement established only:

a. Within control zones.

b. When requested by the pilot.

c. On the basis of weather conditions reported at the airport of intended landing/departure, or

7-40c Reference. — Climb to VFR, 7-45; Ground Visibility Below One Mile, 7-46.

d. When weather conditions are not reported at the airport of intended landing/departure and the pilot advises he is unable to maintain VFR and requests Special VFR.

Phraseology:

CLEARED TO ENTER/OUT OF/THROUGH CONTROL ZONE, *and, if required,* (direction) OF (airport name) AIRPORT (specified routing), *and* MAINTAIN SPECIAL V-F-R CONDITIONS WHILE IN CONTROL ZONE; *or as applicable for operation under an exemption from FAR 93.113:* CLEARED FOR (coded arrival or departure procedure) ARRIVAL/DEPARTURE, (additional instructions as required).

7-40 Note. — FAR 91.107(e) limits the use of Special VFR by pilots of fixed-wing aircraft to daylight hours except where the pilot is instrument rated and currently qualified, and the aircraft is equipped for IFR flight.

7-41 PRIORITY

a. FW/SVFR flights may be approved only if arriving and departing IFR aircraft are not delayed.

7-41a Example 1. —

A FW/SVFR aircraft has been cleared to enter the control zone and subsequently an IFR aircraft is ready to depart or is in position to begin an approach. Less overall delay might accrue to the IFR aircraft if the FW/SVFR aircraft is allowed to proceed to the airport and land, rather than leave the control zone or be repositioned to provide IFR priority.

7-41a Example 2. —

A FW/SVFR aircraft is number one for takeoff and located in such a position that the number two aircraft, an IFR flight, cannot taxi past to gain access to the runway. Less overall delay might accrue to the IFR aircraft by releasing the FW/SVFR departure rather than by having the aircraft taxi down the runway to a turnoff point so the the IFR aircraft could be released first.

7-41a. Note. — The priority afforded IFR aircraft over FW/SVFR aircraft is not intended to be so rigidly applied that it causes grossly inefficient use of airspace. If better overall efficiency will be gained thereby, the controller has the prerogative of allowing completion of the FW/SVFR operation already in progress when an IFR aircraft becomes a factor.

b. When clearance cannot be granted for a FW/SVFR flight because of IFR traffic, inform the aircraft of the anticipated delay. Do not issue EFC or expected departure time.

Phraseology:

EXPECT (number) MINUTES DELAY, (additional instructions as necessary).

7-42 SEPARATION

Apply approved separation between:

a. Special VFR aircraft.

b. Special VFR aircraft and IFR aircraft.

7-42 Note. — Approved separation is that prescribed for IFR and Special VFR in Chapter 7, Section 5. Radar vectors are authorized as prescribed in 5-90.

7-43 ALTITUDE ASSIGNMENT

Do not assign a fixed altitude when applying vertical separation, but clear the Special VFR aircraft at or below an altitude which is at least 500 feet below any conflicting IFR traffic but not below the minimum safe altitude prescribed in FAR 91.79.

Phraseology:

MAINTAIN SPECIAL V-F-R CONDITIONS AT OR BELOW (altitude).

7-43 Note 1. — Special VFR aircraft are not assigned fixed altitudes because of the clearance from clouds requirement.

7-43 Note 2. — The minimum safe altitudes are (1) over congested areas, an altitude at least 1,000 feet above the highest obstacle, and (2) over other than congested areas, an altitude at least 500 feet above the surface.

7-44 LOCAL OPERATIONS

Authorize local Special VFR operations for a specified period (series of landings and takeoffs, etc.) upon request if the aircraft can be recalled when traffic or weather conditions require. Where warranted, letters of agreement may be consummated.

Phraseology:

LOCAL SPECIAL V-F-R OPERATIONS IN THE IMMEDIATE VICINITY OF (airport name) AIRPORT ARE AUTHORIZED UNTIL (time). MAINTAIN SPECIAL V-F-R CONDITIONS.

7-44 Reference. — Order 7210.3 — 431, Appropriate Subjects.

7-45 CLIMB TO VFR

Authorize an aircraft to climb to VFR upon request if the only weather limitation is restricted visibility.

Phraseology:

CLIMB TO V-F-R WITHIN THE CONTROL ZONE/WITHIN (a specified distance within control zone) MILES FROM (airport name) AIRPORT, MAINTAIN SPECIAL V-F-R CONDITIONS UNTIL REACHING V-F-R.

7-46 GROUND VISIBILITY BELOW ONE MILE

When the ground visibility is officially reported at an airport as less than 1 mile, treat requests for Special VFR operations at that airport by other than helicopters as follows:

7-46 Note. — FAR 91 does not prohibit helicopter Special VFR flights when visibility is less than 1 mile.

a. Inform departing aircraft that ground visibility is less than 1 mile and that a clearance cannot be issued.

b. Inform arriving aircraft, operating outside of the control zone, that ground visibility is less than 1 mile and that, unless an emergency exists, a clearance cannot be issued.

c. Inform arriving aircraft, operating within the control zone, that ground visibility is less than 1 mile, and ask if the aircraft can depart the control zone with a flight visibility of at least 1 mile. If the reply is "yes," issue a clearance out of control zone. If the reply is "no," or an emergency exists, issue a clearance as soon as traffic conditions permit.

d. Authorize scheduled air carrier aircraft in the United States to conduct operations if ground visibility is not less than ½ statute mile.

7-46d Note. — FAR 121 permits landing or takeoff by domestic scheduled air carriers where a local surface restriction to visibility is not less than ½ statute mile, provided all turns after takeoff or before landing and all flights beyond 1 statute mile from the airport boundary can be accomplished above or outside the area so restricted. The pilot is solely responsible for determining if the nature of the visibility restriction will permit compliance with the provisions of FAR 121.

e. Clear an aircraft to fly through the control zone if he reports flight visibility is at least 1 statute mile.

7-47 FLIGHT VISIBILITY BELOW ONE MILE

When weather conditions are not officially reported at an airport and the pilot advises the flight visibility is less than 1 statute mile, treat requests for Special VFR operations at that airport by other than helicopters as follows:

7-47 Note. — FAR 91 prescribes use of officially reported ground visibility at airports where it is provided, and landing or takeoff "flight visibility" where it is not, as the governing ground visibility for basic and Special VFR operations.

a. Inform departing aircraft that a clearance cannot be issued.

b. Inform arriving aircraft operating outside of the control zone that a clearance cannot be issued unless an emergency exists.

c. Ask an arriving aircraft operating within a control zone if he can depart the control zone with a flight visibility of at least 1 statute mile. If the aircraft cannot depart the control zone accordingly, or an emergency exists, issue a clearance as soon as traffic conditions permit.

7-48 SPECIAL VFR HELICOPTER SEPARATION

a. Control a Special VFR helicopter by Special VFR procedures unless other procedures are contained in a letter of agreement.

TERMINAL

b. Control a Special VFR helicopter by visual separation or Special VFR procedures unless local procedures are contained in a letter of agreement.

7-48 Note. — Control of IFR helicopters is governed by nonradar or radar procedures and minima.

7-49 LOCAL PROCEDURES

TERMINAL

At locations where the volume or complexity of helicopter operations warrants, a letter of agreement shall specify that Special VFR helicopters are required to maintain visual reference to the surface and the traffic patterns, routes and reporting or holding fixes necessary to achieve separation, in accordance with the following minima:

a. Between Special VFR helicopters — *1 mile.* You may, however, use *200 feet* if they are departing simultaneously on diverging courses and you can determine this minimum by reference to the surface markings or you instruct one to remain at least 200 feet from each other.

appropriate for the direction of flight when the altitude assignment is no longer needed for separation or when leaving the TCA or TRSA.

Phraseology:

RESUME APPROPRIATE VFR ALTITUDES.

7-95 APPROACH INTERVAL

The tower shall specify the approach interval

7-96 TRSA DEPARTURE INFORMATION

a. At controlled airports within the TRSA, inform a departing aircraft proposing to operate within the TRSA when to contact departure control and the frequency to use. If the aircraft is properly equipped, ground control or clearance delivery shall issue the appropriate beacon code.

7-96a Note. — Departing aircraft are assumed to want Stage III service unless the pilot states, "Negative Stage III," or makes a similar comment. Pilots are expected to inform the controller of intended destination and/or route of flight and altitude.

b. Provide separation until the aircraft leaves the TRSA.

c. Inform VFR participating aircraft when leaving the TRSA.

Phraseology:

LEAVING THE (name) TRSA *and, as appropriate,* RESUME OWN NAVIGATION, STAND BY FOR TRAFFIC ADVISORIES, RADAR SERVICE TERMINATED, SQUAWK ONE TWO ZERO ZERO, *etc.*

d. Aircraft departing satellite controlled airports that will penetrate the TRSA should be provided the same service as those aircraft departing the primary airport. Procedures for handling this situation shall be covered in a letter of agreement or facility directives, as appropriate.

e. Procedures for handling aircraft departing uncontrolled satellite airports must be advertised in a facility bulletin and service provided accordingly.

7-97 TCA METHODS

a. To the extent practical, clear large turbine-powered aircraft to/from the primary airport using altitudes and routes that avoid VFR corridors and airspace below the TCA floor where VFR aircraft are operating.

7-97a Note. — Pilots operating in accordance with VFR are expected to advise ATC if compliance with assigned altitudes, headings, or routes will cause any violation of FAR's.

b. Workload and traffic conditions permitting, approve/deny requests from VFR aircraft to operate in TCA's.

7-97b Examples. —

"Approved as requested. (Additional instructions, as necessary.)"

"Unable to approve clearance through TCA. (When necessary, reason and/or additional instructions.)"

"Cleared to Los Angeles airport. Enter TCA at three thousand five hundred, vicinity of Queen Mary."

"Cleared to enter TCA via direct Oakland VOR. Maintain four thousand five hundred while in TCA."

"Climb through TCA approved. Report leaving seven thousand."

c. Inform VFR aircraft when leaving the TCA.

Phraseology:

LEAVING THE (name) TCA *and, as appropriate,* RESUME OWN NAVIGATION, STAND BY FOR TRAFFIC ADVISORIES, RADAR SERVICE TERMINATED, SQUAWK ONE TWO ZERO ZERO, *etc.*

d. Vector aircraft to contain them in the TCA once they have entered it. If it is necessary to extend an aircraft's flight path outside the TCA for spacing, inform the aircraft when it leaves and reenters the TCA.

7-97d Note. — FAR 91.90 requires large, turbine-powered aircraft operating to or from the primary airport to operate at or above the designated floor of the TCA while within the lateral limits, unless otherwise authorized by ATC. Such authorization should be the exception rather than the rule.

TABLE OF CONTENTS

Chapter 10. CANADIAN AIRSPACE PROCEDURES

Page

Section 1. GENERAL CONTROL

10-1 Application 10-1
10-2 Definitions 10-1
10-3 Class B Airspace 10-1
10-4 Altimeter Setting 10-2
10-5 Altitude Assignment 10-2
10-6 Departure Clearance/Communication Failure 10-2
10-7 Parachute Jumping 10-2
10-8 Transponder/Mode C Deviations (IFR) Flight 10-2
10-9 Reserved 10-2

Section 2. IFR OPERATIONS

10-10 Longitudinal Separation 10-3
10-11 Vertical Separation 10-3
10-12 Lateral Separation 10-3
10-13 Initial Separation of Departures and Arrivals 10-4
10-14 Visual Separation and VFR 10-4
10-15 Special VFR 10-4
10-16 Approaches 10-4
10-17 Lengthy Delay 10-5
10-18 Altitude for Direction of Flight 10-5
10-19—10-29 Reserved 10-5

Section 3. RADAR OPERATION

10-30 Radar Separation 10-6
10-31 Radar Separation Minima 10-6
10-32 Passing—Opposite Courses 10-6
10-33 Class F (Special Use) Airspace 10-6
10-34 Wake Turbulence Separation Minima 10-6
10-35 Radar Arrivals 10-6
10-36 Emergency 10-7
10-37—10-49 Reserved 10-7

Section 4. FUEL DUMPING

10-50 Separation 10-8
10-51 Advisories 10-8

Chapter 10. CANADIAN AIRSPACE PROCEDURES

Section 1. GENERAL CONTROL

10-1 APPLICATION

a. Where control responsibility within Canadian airspace has been formally delegated to the FAA by the Canadian Ministry of Transport, apply basic FAA procedures except for the Canadian procedures (exceptions, additions, and modifications) contained in this chapter.

b. Do not use the FAA procedures contained in the following paragraphs in Canadian airspace:

(1) Above FL 230 — 6-31a.

10-1b(1) Reference. — Minima on Same, Converging or Crossing Courses, 6-31.

(2) At any time:

(a) 6-31e.

(b) Section 7 of Chapter 6.

(c) 7-10.

(d) 5-73.

(e) 5-112.

(f) 5-124.

10-1b(2) References. — Passing or Diverging, 5-73; Vectors Below Minimum Altitude, 5-112; Approach Separation Responsibility, 5-124; Minima on Same, Converging, or Crossing Courses, 6-31; Timed Approaches, Chapter 6, Section 7; Visual Separation, 7-10.

(3) *TERMINAL:* The cleared for the option procedures.

10-1b(3) Reference. — Sequence/Spacing Application, 3-90.

10-2 DEFINITIONS

Class A Airspace — Controlled airspace within which only IFR flights are permitted.

Class B Airspace — Controlled airspace within which only IFR and Controlled VFR flights are permitted.

Class C Airspace — Controlled airspace within which both IFR and VFR flights are permitted but VFR flights require a clearance from ATC to enter.

Class D Airspace — Controlled airspace within which both IFR and VFR flights are permitted but VFR flights do not require a clearance from ATC to enter.

Class E Airspace — Airspace within which IFR and VFR flights are not subject to control.

Class F Airspace — Airspace of defined dimensions within which activities must be confined because of their nature, or within which limitations are imposed upon aircraft operations that are not a part of those activities, or both.

High Level Airspace — All airspace within the Canadian Domestic Airspace 18,000 feet MSL and above.

Low Level Airspace — All airspace within the Canadian Domestic Airspace below 18,000 feet MSL.

Alert Area — An airspace of defined dimensions within which a high volume of pilot training or an unusual type of aerial activity may be carried out. (Publication designation — CYA).

Danger Area — An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times. (Publication designation — CYO.)

Military Flying Area — An airspace of defined dimensions within High Level Airspace designated for the use of Military Training and Testing.

Controlled VFR Flight — A flight conducted under the visual flight rules within Class B Airspace and in accordance with an air traffic control clearance.

10-3 CLASS B AIRSPACE

The ATC procedures pertinent to IFR flight shall be applied to controlled visual flight rules (CVFR) aircraft. Do not apply visual separation or VFR-on-top clearance or 1000-on-top clearance.

10-3 Note 1. — The CVFR pilot is responsible to maintain VFR flight and visual reference to the ground at all times.

10-3 Note 2. — ATC clearance for CVFR flight will not normally be issued prior to takeoff, but rather upon receipt of a position report and a request for clearance by a pilot upon reaching the last 1,000 foot attitude below the base of Class B Airspace (11,500 MSL).

10-4 ALTITMETER SETTING

a. For departing aircraft:

Issue altimeter setting even though the aircraft states that it has the current ATIS information. You may omit time and altimeter in a taxi clearance if the information was issued in a preflight radio check.

b. For arriving aircraft:

Except for the altimeter setting, you need not issue information included in the current ATIS broadcast provided the aircraft acknowledges receipt of the broadcast.

c. For en route aircraft:

Issue the altimeter setting associated with a reporting point when an en route aircraft operating below FL 180 reports passing it. In addition, issue the setting for the next reporting point along the aircraft's route.

10-4c Reference. — Altimeter Setting Issuance Below Lowest Usable FL, 2-111.

10-5 ALTITUDE ASSIGNMENT

a. When issuing altitude information, do not use the term "cruise."

10-5a Reference. — Altitude Information, 4-45.

b. When a higher altitude is required because of an MEA, clear the aircraft so it will be at or above the new MEA before arriving at the fix beyond which it applies.

10-5b Reference. — Minimum En route Altitudes, 4-44.

10-6 DEPARTURE CLEARANCE/COMMUNICATION FAILURE

a. Base control action regarding radio failures in Canadian Airspace on the fact that pilots are required to comply with Canadian Airspace Regulations.

b. Canadian communication failure regulations are similar to FAR 91.127; however, the following major difference shall be considered when planning control actions:

Except when issued alternate radio failure instructions by an ATC Unit, pilots flying a turbine-powered (turboprop or turbojet) aircraft and cleared on departure to a point other than the destination will proceed to the destination airport in accordance with the flight plan, maintaining the last assigned altitude or flight level or the minimum en route IFR altitude, whichever is higher, until 10 minutes beyond the point specified in the clearance (clearance limit), and then proceed at altitude(s) or flight level(s) filed in the flight plan. When the aircraft will enter United States' airspace within 10 minutes after passing the clearance limit, the climb to the flight planned border crossing altitude is to be commenced at the estimated time of crossing the Canadian/United States boundary.

c. When issuing clearances to departures from Canadian airports and paragraph 4-21h(3) applies, specify the radio failure altitude in lieu of issuing the "Expect (altitude)."

Phraseology:

IN THE EVENT OF RADIO FAILURE, MAINTAIN (the filed altitude or an altitude within the filed stratum as near as possible to the filed altitude).

10-7 PARACHUTE JUMPING

Do not authorize parachute jumping without prior permission from the appropriate Canadian authority.

10-7 Note. — Canadian regulations require written authority from the Ministry of Transport.

10-8 TRANSPONDER/MODE C DEVIATIONS (IFR FLIGHT)

Preflight transponder/Mode C deviations can be approved in Canadian airspace only upon receipt of written notification.

10-8 Note. — Remarks in flight plan may serve as written notification.

10-9 RESERVED

APPENDIX A

PILOT/CONTROLLER GLOSSARY

FEBRUARY 14, 1985

This Glossary was compiled to promote a common understanding of the terms used in the Air Traffic Control system. It includes those terms which are intended for pilot/controller communications. Those terms most frequently used in pilot/controller communications are printed in ***bold italics***. The definitions are primarily defined in an operational sense applicable to both users and operators of the National Airspace System. Use of the Glossary will preclude any misunderstandings concerning the system's design, function, and purpose.

Because of the international nature of flying, terms used in the "Lexicon," published by the International Civil Aviation Organization (ICAO), are included when they differ from FAA definitions. These terms are *italicized*. For the reader's convenience, there are also cross references to related terms in other parts of the Glossary and to other documents, such as the Federal Aviation Regulations (FARs) and the Airman's Information Manual (AIM).

This Glossary will be revised as necessary to maintain a common understanding of the system.

ABBREVIATED IFR FLIGHT PLANS— An authorization by ATC requiring pilots to submit only that information needed for the purpose of ATC. It includes only a small portion of the usual IFR flight plan information. In certain instances, this may be only aircraft identification, location, and pilot request. Other information may be requested if needed by ATC for separation/control purposes. It is frequently used by aircraft which are airborne, desire an instrument approach, or by aircraft on the ground which desire a climb to VFR on top. (See VFR-ON-TOP) (Refer to AIM)

ABEAM— An aircraft is "abeam" a fix, point or object when that fix, point or object is approximately 90 degrees to the right or left of the aircraft track. Abeam indicates a general position rather than a precise point.

ABORT— To terminate a preplanned aircraft maneuver; e.g., an aborted takeoff.

ACKNOWLEDGE— Let me know that you have received and understand my message.

ACROBATIC FLIGHT— An intentional maneuver involving an abrupt change in an aircraft's attitude, an abnormal attitude, or abnormal acceleration, not necessary for normal flight. (Refer to FAR Part 91)

*ICAO—ACROBATIC FLIGHT—*Maneuvers intentionally performed by an aircraft involving an abrupt change in its attitude, an abnormal attitude, or an abnormal variation in speed.

ADDITIONAL SERVICES— Advisory information provided by ATC which includes but is not limited to the following:

1. Traffic advisories.
2. Vectors, when requested by the pilot, to assist aircraft receiving traffic advisories to avoid observed traffic.
3. Altitude deviation information of 300 feet or more from an assigned altitude as observed on a verified (reading correctly) automatic altitude readout (Mode C).
4. Advisories that traffic is no longer a factor.
5. Weather and chaff information.
6. Weather assistance.
7. Bird activity information.
8. Holding pattern surveillance.

Additional services are provided to the extent possible contingent only upon the controller's capability to fit them into the performance of higher priority duties and on the basis of limitations of the radar, volume of traffic, frequency congestion and controller workload. The controller has complete discretion for determining if he is able to provide or continue to provide a service in a particular case. The controller's reason not to provide or continue to provide a service in a particular case is not subject to question by the pilot and need not be made known to him. (See Traffic Advisories) (Refer to AIM)

ADMINISTRATOR— The Federal Aviation Administrator or any person to whom he has delegated his authority in the matter concerned.

ADVISE INTENTIONS— Tell me what you plan to do.

ADVISORY— Advice and information provided to assist pilots in the safe conduct of flight and aircraft movement. (See Advisory Service)

ADVISORY FREQUENCY— The appropriate frequency to be used for Airport Advisory Service. (See Airport Advisory Service and UNICOM) (Refer to Advisory Circular No. 90-42 and AIM)

ADVISORY SERVICE— Advice and information provided by a facility to assist pilots in the safe conduct of flight and aircraft movement. (See Airport Advisory Service, Traffic Advisories, Safety Advisories, Additional Services, Radar Advisory, En Route Flight Advisory Service) (Refer to AIM)

AERIAL REFUELING/IN-FLIGHT REFUELING— A procedure used by the military to transfer fuel from one aircraft to another during flight. (Refer to VFR/IFR Wall Planning Charts).

AERODROME— A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and movement of aircraft.

AERONAUTICAL BEACON— A visual NAVAID displaying flashes of white and/or colored light to indicate the location of an airport, a heliport, a landmark, a certain point of a Federal airway in mountainous terrain, or an obstruction. (See Airport Rotating Beacon) (Refer to AIM)

AERONAUTICAL CHART— A map used in air navigation containing all or part of the following: Topographic features, hazards and obstructions, navigation aids, navigation routes, designated airspace, and airports. Commonly used aeronautical charts are:

1. Sectional Charts—1:500,000—Designed for visual navigation of slow or medium speed aircraft. Topographic information on these charts features the portrayal of relief, and a judicious selection of visual check points for VFR flight. Aeronautical information includes visual and radio aids to navigation, airports, controlled airspace, restricted areas, obstructions and related data.
2. VFR Terminal Area Charts—1:250,000—Depict Terminal Control Area (TCA) airspace which provides for the control or segregation of all the aircraft within the TCA. The chart depicts topographic information and aeronautical information which includes visual and radio aids to navigation, airports, controlled airspace, restricted areas, obstructions, and related data.
3. World Aeronautical Charts (WAC)—1:1,000,000—Provide a standard series of aeronautical charts covering land areas of the world at a size and scale convenient for navigation by moderate speed aircraft. Topographic information includes cities and towns, principal roads, railroads, distinctive landmarks, drainage, and relief. Aeronautical information includes visual and radio aids to navigation, airports, airways, restricted areas, obstructions and other pertinent data.
4. En Route Low Altitude Charts—Provide aeronautical information for en route instrument navigation (IFR) in the low altitude stratum. Information includes the portrayal of airways, limits of controlled airspace, position identification and frequencies of radio aids, selected airports, minimum en route and minimum obstruction clearance altitudes, airway distances, reporting points, restricted areas, and related data. Area charts which are a part of this series furnish terminal data at a larger scale in congested areas.
5. En Route High Altitude Charts—Provide aeronautical information for en route instrument navigation (IFR) in the high altitude stratum. Information includes the portrayal of jet routes, identification and frequencies of radio aids, selected airports, distances, time zones, special use airspace, and related information.
6. Instrument Approach Procedures (IAP) Charts—Portray the aeronautical data which is required to execute an instrument approach to an airport. These charts depict the procedures, including all related data, and the airport diagram. Each procedure is designated for use with a specific type of electronic navigation system including NDB, TACAN, VOR, ILS, and RNAV. These charts are identified by the type of navigational aid(s) which provide final approach guidance.
7. Standard Instrument Departure (SID) Charts—Designed to expedite clearance delivery and to facilitate transition between takeoff and en route operations. Each SID procedure is presented as a separate chart and may serve a single airport or more than one airport in a given geographical location.
8. Standard Terminal Arrival (STAR) Charts—Designed to expedite air traffic control arrival route procedures and to facilitate transition between en route and instrument approach operations. Each STAR procedure is presented as a separate chart and may serve a single airport or more than one airport in a given geographical location.
9. Airport Taxi Charts—Designed to expedite the efficient and safe flow of ground traffic at an airport. These charts are identified by the official airport name; e.g., Washington National Airport.

ICAO—AERONAUTICAL CHART—A representation of a portion of the earth, its culture and relief, specifically designated to meet the requirements of air navigation.

***AFFIRMATIVE*—** Yes.

AIR CARRIER DISTRICT OFFICE/ACDO— An FAA field office serving an assigned geographical area, staffed with Flight Standards personnel serving the aviation industry and the general public on matters related to the certification and operation of scheduled air carriers and other large aircraft operations.

AIRCRAFT— Device/s that are used or intended to be used for flight in the air, and when used in air traffic control terminology, may include the flight crew.

ICAO-AIRCRAFT—Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

AIRCRAFT APPROACH CATEGORY— A grouping of aircraft based on a speed of 1.3 times the stall speed in the landing configuration at maximum gross landing weight. An aircraft shall fit in only one category. If it is necessary to maneuver at speeds in excess of the upper limit of a speed range for a category, the minimums for the next higher category should be used. For example, an aircraft which falls in Category the Minimum Descent Altitude (MDA) or Decision Height (DH) prescribed in the instrument approach procedures as follows:

1. Straight-in landing minimums—A statement of MDA and visibility, or DH and visibility, required for straight-in landing on a specified runway, or
2. Circling minimums— A statement of MDA and visibility required for the circle-to-land maneuver.

Descent below the established MDA or DH is not authorized during an approach unless the aircraft is in a position from which a normal approach to the runway of intended landing can be made and adequate visual reference to required visual cues is maintained. (See Straight-in Landing, Circle-to-Land Maneuver, Decision Height, Minimum Descent Altitude, Visibility, Instrument Approach Procedure) (Refer to FAR Part 91)

LANDING ROLL— The distance from the point of touchdown to the point where the aircraft can be brought to a stop or exit the runway.

LANDING SEQUENCE— The order in which aircraft are positioned for landing. (See Approach Sequence)

LAST ASSIGNED ALTITUDE— The last altitude/flight level assigned by ATC and acknowledged by the pilot. (See Maintain) (Refer to FAR Part 91)

LATERAL SEPARATION— The lateral spacing of aircraft at the same altitude by requiring operation on different routes or in different geographical locations. (See Separation)

LIGHTED AIRPORT— An airport where runway and obstruction lighting is available. (See Airport Lighting) (Refer to AIM)

LIGHT GUN— A handheld directional light signaling device which emits a brilliant narrow beam of white, green, or red light as selected by the tower controller. The color and type of light transmitted can be used to approve or disapprove anticipated pilot actions where radio communication is not available. The light gun is used for controlling traffic operating in the vicinity of the airport and on the airport movement area. (Refer to AIM)

LOCALIZER— The component of an ILS which provides course guidance to the runway. (See Instrument Landing System) (Refer to AIM)

ICAO—LOCALIZER COURSE (ILS)— The locus of points, in any given horizontal plane, at which the DDM (difference in depth of modulation) is zero.

LOCALIZER TYPE DIRECTIONAL AID/LDA— A NAVAID used for nonprecision instrument approaches with utility and accuracy comparable to a localizer but which is not a part of a complete ILS and is not aligned with the runway. (Refer to AIM)

LOCALIZER USABLE DISTANCE— The maximum distance from the localizer transmitter at a specified altitude, as verified by flight inspection, at which reliable course information is continuously received. (Refer to AIM)

LOCAL TRAFFIC— Aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from flight in local practice areas, or aircraft executing practice instrument approaches at the airport. (See Traffic Pattern)

LONGITUDINAL SEPARATION— The longitudinal spacing of aircraft at the same altitude by a minimum distance expressed in units of time or miles. (See Separation) (Refer to AIM)

LORAN/LONG RANGE NAVIGATION— An electronic navigational system by which hyperbolic lines of position are determined by measuring the difference in the time of reception of synchronized pulse signals from two fixed transmitters. Loran A operates in the 1750—1950 kHz frequency band. Loran C and D operate in the 100—110 kHz frequency band. (Refer to AIM)

LOST COMMUNICATIONS/TWO-WAY RADIO COMMUNICATIONS FAILURE— Loss of the ability to communicate by radio. Aircraft are sometimes referred to as NORDO (No Radio). Standard pilot procedures are specified in FAR Part 91. Radar controllers issue procedures for pilots to follow in the event of lost communications during a radar approach when weather reports indicate that an aircraft will likely encounter IFR weather conditions during the approach. (Refer to FAR Part 91, AIM)

LOW ALTITUDE AIRWAY STRUCTURE/FEDERAL AIRWAYS— The network of airways serving aircraft operations up to but not including 18,000 feet MSL. (See Airway) (Refer to AIM)

LOW ALTITUDE ALERT, CHECK YOUR ALTITUDE IMMEDIATELY— (See Safety Advisory)

LOW ALTITUDE ALERT SYSTEM/LAAS— An automated function of the TPX-42 that alerts the controller when a Mode C transponder-equipped aircraft on an IFR flight plan is below a predetermined minimum safe altitude. If requested by the pilot, LAAS monitoring is also available to VFR Mode C transponder-equipped aircraft.

LOW APPROACH— An approach over an airport or runway following an instrument approach or a VFR approach including the go-around maneuver where the pilot intentionally does not make contact with the runway. (Refer to AIM)

LOW FREQUENCY/LF— The frequency band between 30 and 300 kHz. (Refer to AIM)

MACH NUMBER— The ratio of true airspeed to the speed of sound; e.g., MACH .82, MACH 1.6. (See Airspeed)

MAINTAIN—

1. Concerning altitude/flight level, the term means to remain at the altitude/flight level specified. The phrase "climb and" or "descend and" normally precedes "maintain" and the altitude assignment; e.g., "descend and maintain 5,000."
2. Concerning other ATC instructions, the term is used in its literal sense; e.g., maintain VFR.

MAKE SHORT APPROACH— Used by ATC to inform a pilot to alter his traffic pattern so as to make a short final approach. (See Traffic Pattern)

MANDATORY ALTITUDE— An altitude depicted on an instrument Approach Procedure Chart requiring the aircraft to maintain altitude at the depicted value.

MARKER BEACON— An electronic navigation facility transmitting a 75 MHz vertical fan or boneshaped radiation pattern. Marker beacons are identified by their modulation frequency and keying code, and when received by compatible airborne equipment, indicate to the pilot, both aurally and visually, that he is passing over the facility. (See Outer Marker, Middle Marker, Inner Marker) (Refer to AIM)

MAXIMUM AUTHORIZED ALTITUDE/MAA— A published altitude representing the maximum usable altitude or flight level for an airspace structure or route segment. It is the highest altitude on a Federal airway, Jet route, area navigation low or high route, or other direct route for which an MEA is designated in FAR Part 95 at which adequate reception of navigation aid signals is assured.

MAYDAY— The international radiotelephony distress signal. When repeated three times, it indicates imminent and grave danger and that immediate assistance is requested. (See PAN) (Refer to AIM)

METEOROLOGICAL IMPACT STATEMENT/MIS— An unscheduled planning forecast describing conditions expected to begin within 4 to 12 hours which may impact the flow of air traffic in a specific center's (ARTCC) area.

METERING— A method of time-regulating arrival traffic flow into a terminal area so as not to exceed a predetermined terminal acceptance rate.

METERING FIX— A fix along an established route from over which aircraft will be metered prior to entering terminal airspace. Normally, this fix should be established at a distance from the airport which will facilitate a profile descent 10,000 feet above airport elevation (AAE) or above.

MIA— (See Minimum IFR Altitudes)

MICROWAVE LANDING SYSTEM/MLS— An instrument landing system operating in the microwave spectrum which provides lateral and vertical guidance to aircraft having compatible avionics equipment. (See Instrument Landing System) (Refer to AIM)

MIDDLE COMPASS LOCATOR— (See Compass Locator)

MIDDLE MARKER/MM— A marker beacon that defines a point along the glide slope of an ILS normally located at or near the point of decision height (ILS Category I). It is keyed to transmit alternate dots and dashes, with the alternate dots and dashes keyed at the rate of 95 dot/dash combinations per minute, on a 1300 Hz tone, which is received aurally and visually by compatible airborne equipment. (See Marker Beacon, Instrument Landing System) (Refer to AIM)

MID RVR— (See Visibility)

MILITARY AUTHORITY ASSUMES RESPONSIBILITY FOR SEPARATION OF AIRCRAFT/MARSA— A condition whereby the military services involved assume responsibility for separation between participating military aircraft in the ATC system. It is used only for required IFR operations which are specified in letters of agreement or other appropriate FAA or military documents.

MILITARY OPERATIONS AREA/MOA— (See Special Use Airspace)

MILITARY TRAINING ROUTES/MTR— Airspace of defined vertical and lateral dimensions established for the conduct of military flight training at airspeeds in excess of 250 knots IAS. (See IFR (IR) and VFR (VR) Military Training Routes)

MINIMUM CROSSING ALTITUDE/MCA— The lowest altitude at certain fixes at which an aircraft must cross when proceeding in the direction of a higher minimum en route IFR altitude (MEA). (See Minimum En Route IFR Altitude)

MINIMUM DESCENT ALTITUDE/MDA— The lowest altitude, expressed in feet above mean sea level, to which descent is authorized on final approach or during circle-to-land maneuvering in execution of a standard instrument approach procedure where no electronic glide slope is provided. (See Nonprecision Approach Procedure)

MINIMUM EN ROUTE IFR ALTITUDE/MEA— The lowest published altitude between radio fixes which assures acceptable navigational signal coverage and meets obstacle clearance requirements between those fixes. The MEA prescribed for a Federal airway or segment thereof, area navigation low or high route or other direct route applies to the entire width of the airway, segment or route between the radio fixes defining the airway, segment, or route. (Refer to FAR Parts 91 and 95; AIM)

MINIMUM FUEL— Indicates that an aircraft's fuel supply has reached a state where, upon reaching the destination, it can accept little or no delay. This is not an emergency situation but merely indicates an emergency situation is possible should any undue delay occur. (Refer to AIM)

MINIMUM HOLDING ALTITUDE/MHA— The lowest altitude prescribed for a holding pattern which assures navigational signal coverage, communications, and meets obstacle clearance requirements.

MINIMUM IFR ALTITUDES/MIA— Minimum altitudes for IFR operations as prescribed in FAR Part 91. These altitudes are published on aeronautical charts and prescribed in FAR Part 95 for airways and routes, and in FAR Part 97 for standard instrument approach procedures. If no applicable minimum altitude is prescribed in FAR Parts 95 or 97, the following minimum IFR altitude applies:

1. In designated mountainous areas, 2,000 feet above the highest obstacle within a horizontal distance of 5 statute miles from the course to be flown; or
2. Other than mountainous areas, 1,000 feet above the highest obstacle within a horizontal distance of 5 statute miles from the course to be flown; or

zone designator is used to indicate local time; e.g., "0205M." The end and beginning of the day are shown by "2400" and "0000," respectively.

TORCHING— The burning of fuel at the end of an exhaust pipe or stack of a reciprocating aircraft engine, the result of an excessive richness in the fuel air mixture.

TOUCH-AND-GO/TOUCH-AND-GO LANDING— An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway.

TOUCHDOWN—

1. The point at which an aircraft first makes contact with the landing surface.
2. Concerning a precision radar approach (PAR), it is the point where the glide path intercepts the landing surface.

ICAO—TOUCHDOWN— The point where the nominal glide path intercepts the runway.

TOUCHDOWN RVR— (See Visibility)

TOUCHDOWN ZONE— The first 3,000 feet of the runway beginning at the threshold. The area is used for determination of Touchdown Zone Elevation in the development of straight-in landing minimums for instrument approaches.

TOUCHDOWN ZONE ELEVATION/TDZE— The highest elevation in the first 3,000 feet of the landing surface. TDZE is indicated on the instrument approach procedure chart when straight-in landing minimums are authorized. (See Touchdown Zone)

TOUCHDOWN ZONE LIGHTING— (See Airport Lighting)

TOWER/AIRPORT TRAFFIC CONTROL TOWER— A terminal facility that uses air/ground communications, visual signaling, and other devices to provide ATC services to aircraft operating in the vicinity of an airport or on the movement area. Authorizes aircraft to land or takeoff at the airport controlled by the tower or to transit the airport traffic area regardless of flight plan or weather conditions (IFR or VFR). A tower may also provide approach control services (radar or nonradar). (See Airport Traffic Area, Airport Traffic Control Service, Approach Control/Approach Control Facility, Approach Control Service, Movement Area, Tower En Route Control Service/Tower to Tower) (Refer to AIM)

ICAO—AERODROME CONTROL TOWER— A unit established to provide air traffc control service to aerodrome traffic.

TOWER EN ROUTE CONTROL SERVICE/TOWER TO TOWER— The control of IFR en route traffic within delegated airspace between two or more adjacent approach control facilities. This service is designed to expedite traffic and reduce control and pilot communication requirements.

TPX 42— A numeric beacon decoder equipment/system. It is designed to be added to terminal radar systems for beacon decoding. It provides rapid target identification, reinforcement of the primary radar target, and altitude information from Mode C. (See Automated Radar Terminal Systems, Transponder)

TRACK— The actual flight path of an aircraft over the surface of the earth. (See Course, Route, Flight Path)

*ICAO—TRACK—*The projection on the earth's surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from north (true, magnetic, or grid).

TRAFFIC—

1. A term used by a controller to transfer radar identification of an aircraft to another controller for the purpose of coordinating separation action. Traffic is normally issued (a) in response to a handoff or point out, (b) in anticipation of a handoff or point out, or (c) in conjunction with a request for control of an aircraft.
2. A term used by ATC to refer to one or more aircraft.

(Identification), TRAFFIC ALERT. ADVISE YOU TURN LEFT/RIGHT (specific heading if appropriate), AND/OR CLIMB/DESCEND (specific altitude if appropriate) IMMEDIATELY. (See Safety Advisory)

TRAFFIC ADVISORIES— Advisories issued to alert pilots to other known or observed air traffic which may be in such proximity to the position or intended route of flight of their aircraft to warrant his attention. Such advisories may be based on:

1. Visual observation.
2. Observation of radar identified and nonidentified aircraft targets on an ATC radar display, or
3. Verbal reports from pilots or other facilities.

The word "traffic" followed by additional information, if known, is used to provide such advisories; e.g., "Traffic, 2 o'clock, one zero miles, southbound, eight thousand."

Traffic advisory service will be provided to the extent possible depending on higher priority duties of the controller or other limitations, e.g., radar limitations, volume of traffic, frequency congestion or controller workload. Radar/nonradar traffic advisories do not relieve the pilot of his responsibility to see and avoid other aircraft. Pilots are cautioned that there are many times when the controller is not able to give traffic advisories concerning all traffic in the aircraft's proximity; in other words, when a pilot requests or is receiving traffic advisories, he should not assume that all traffic will be issued. (Refer to AIM, Radar Traffic Information Service)

TRAFFIC INFORMATION— (See Traffic Advisories)

TRAFFIC IN SIGHT— Used by pilots to inform a controller that previously issued traffic is in sight. (See Negative Contact, Traffic Advisories)

TRAFFIC NO LONGER A FACTOR— Indicates that the traffic described in a previously issued traffic advisory is no longer a factor.

TRAFFIC PATTERN— The traffic flow that is prescribed for aircraft landing at, taxiing on, or taking off from an airport. The components of a typical traffic pattern are upwind leg, crosswind leg, downwind leg, base leg and final approach.

1. Upwind Leg—A flight path parallel to the landing runway in the direction of landing.
2. Crosswind Leg—A flight path at right angles to the landing runway off its upwind end.
3. Downwind Leg—A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg.
4. Base Leg—A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline.
5. Final Approach—A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. An aircraft making a straight-in approach VFR is also considered to be on final approach.

(See Straight-In Approach-VFR, Taxi Patterns) (Refer to AIM, FAR Part 91)

ICAO—AERODROME TRAFFIC CIRCUIT— The specified path to be flown by aircraft operating in the vicinity of an aerodrome.

TRANSCRIBED WEATHER BROADCAST/TWEB— A continuous recording of meteorological and aeronautical information that is broadcast on L/MF and VOR facilities for pilots. (Refer to AIM)

TRANSFER OF CONTROL— That action whereby the responsibility for the separation of an aircraft is transferred from one controller to another.

ICAO—TRANSFER OF CONTROL— Transfer of responsibility for providing air traffic control service.

TRANSFERRING CONTROLLER/FACILITY— A controller/facility transferring control of an aircraft to another controller/facility.

ICAO—TRANSFERRING UNIT/CONTROLLER— Air Traffic Control Unit/Air Traffic Controller in the process of transferring the responsibility for providing air traffic control service to an aircraft to the next air traffic control unit/air traffic controller along the route of flight.

TRANSITION—

1. The general term that describes the change from one phase of flight or flight condition to another, e.g., transition from en route flight to the approach or transition from instrument flight to visual flight.
2. A published procedure (SID Transition) used to connect the basic SID to one of several en route airways/jet routes, or a published procedure (STAR Transition) used to connect one of several en route airways/jet routes to the basic STAR. (Refer to SID/STAR Charts)

TRANSITION AREA— (See Controlled Airspace)

TRANSMISSOMETER— An apparatus used to determine visibility by measuring the transmission of light through the atmosphere. It is the measurement source for determining runway visual range (RVR) and runway visibility value (RVV). (See Visibility)

TRANSMITTING IN THE BLIND/BLIND TRANSMISSION— A transmission from one station to other stations in circumstances where two-way communication cannot be established, but where it is believed that the called stations may be able to receive the transmission.

TRANSPONDER— The airborne radar beacon receiver/transmitter portion of the Air Traffic Control Radar Beacon System (ATCRBS) which automatically receives radio signals from interrogators on the ground, and selectively replies with a specific reply pulse or pulse group only to those interrogations being received on the mode to which it is set to respond. (See Interrogator) (Refer to AIM)

*ICAO—TRANSPONDER—*A receiver/transmitter which will generate a reply signal upon proper interrogation; the interrogation and reply being on different frequencies.

TURBOJET AIRCRAFT— An aircraft having a jet engine in which the energy of the jet operates a turbine which in turn operates the air compressor.

TURBOPROP AIRCRAFT— An aircraft having a jet engine in which the energy of the jet operates a turbine which drives the propeller.

T-VOR/TERMINAL-VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION— A very high frequency terminal omnirange station located on or near an airport and used as an approach aid. (See Navigational Aid, VOR)

TWO WAY RADIO COMMUNICATIONS FAILURE— (See Lost Communications)

ULTRAHIGH FREQUENCY/UHF— The frequency band between 300 and 3,000 MHz. The bank of radio frequencies used for military air/ground voice communications. In some instances this may go as low as 225 MHz and still be referred to as UHF.

ULTRALIGHT VEHICLE— An aeronautical vehicle operated for sport or recreational purposes which does not require FAA registration, an airworthiness certificate, nor pilot certification. They are primarily single occupant vehicles, although some two-place vehicles are authorized for training purposes. Operation of an ultralight vehicle in certain airspace requires authorization from ATC. (See FAR 103)

UNABLE— Indicates inability to comply with a specific instruction, request, or clearance.

UNCONTROLLED AIRSPACE— Uncontrolled airspace is that portion of the airspace that has not been designated as continental control area, control area, control zone, terminal control area, or transition area and within which ATC has neither the authority nor the responsibility for exercising control over air traffic. (See Controlled Airspace)

UNDER THE HOOD— Indicates that the pilot is using a hood to restrict visibility outside the cockpit while simulating instrument flight. An appropriately rated pilot is required in the other control seat while this operation is being conducted. (Refer to FAR Part 91)

UNICOM— A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOMs are shown on aeronautical charts and publications. (Refer to AIM, Airport/Facility Directory)

UNPUBLISHED ROUTE— A route for which no minimum altitude is published or charted for pilot use. It may include a direct route between NAVAIDS, a radial, a radar vector, or a final approach course beyond the segments of an instrument approach procedure. (See Published Route, Route)

UPWIND LEG— (See Traffic Pattern)

URGENCY— A condition of being concerned about safety, and of requiring timely but not immediate assistance; a potential Distress condition.

ICAO—URGENCY— A condition concerning the safety of an aircraft or other vehicle, or of person on board or in sight, but which does not require immediate assistance.

VECTOR— A heading issued to an aircraft to provide navigational guidance by radar.

ICAO—RADAR VECTORING— Provision of navigational guidance to aircraft in the form of specific headings, based on the use of radar.

VERIFY— Request confirmation of information; e.g., "verify assigned altitude."

VERIFY SPECIFIC DIRECTION OF TAKEOFF (OR TURNS AFTER TAKEOFF)— Used by ATC to ascertain an aircraft's direction of takeoff and/or direction of turn after takeoff. It is normally used for IFR departures from an airport not having a control tower. When direct communication with the pilot is not possible, the request and information may be relayed through an FSS, dispatcher, or by other means. (See IFR Takeoff Minimums and Departure Procedures)

VERTICAL SEPARATION— Separation established by assignment of different altitudes or flight levels. (See Separation)

*ICAO—VERTICAL SEPARATION—*Separation between aircraft expressed in units of vertical distance.

VERTICAL TAKEOFF AND LANDING AIRCRAFT/VTOL AIRCRAFT— Aircraft capable of vertical climbs and/or descents and of using very short runways or small areas for takeoff and landings. These aircraft include, but are not limited to, helicopters. (See Short Takeoff and Landing Aircraft)

VERY HIGH FREQUENCY/VHF— The frequency band between 30 and 300 MHz. Portions of this band, 108 to 118 MHz, are used for certain NAVAIDS; 118 to 136 MHz are used for civil air/ground voice communications. Other frequencies in this band are used for purposes not related to air traffic control.

VERY LOW FREQUENCY/VLF— The frequency band between 3 and 30 kHz.

VFR AIRCRAFT/VFR FLIGHT— An aircraft conducting flight in accordance with visual flight rules. (See Visual Flight Rules)

VFR CONDITIONS— Weather conditions equal to or better than the minimum for flight under visual flight rules. The term may be used as an ATC clearance/instruction only when:

1. An IFR aircraft requests a climb/descent in VFR conditions.
2. The clearance will result in noise abatement benefits where part of the IFR departure route does not conform to an FAA approved noise abatement route or altitude.
3. A pilot has requested a practice instrument approach and is not on an IFR flight plan.

All pilots receiving this authorization must comply with the VFR visibility and distance from cloud criteria in FAR Part 91. Use of the term does not relieve controllers of their responsibility to separate aircraft in TCAs/TRSAs as required by FAA Handbook 7110.65. When used as an ATC clearance/instruction, the term may be abbreviated "VFR;" e.g., "MAINTAIN VFR," "CLIMB/DESCEND VFR," etc.

VFR-ON-TOP— ATC authorization for an IFR aircraft to operate in VFR conditions at any appropriate VFR altitude (as specified in FAR and as restricted by ATC). A pilot receiving this authorization must comply with the VFR visibility, distance from cloud criteria, and the minimum IFR altitudes specified in FAR Part 91. The use of this term does not relieve controllers of their responsibility to separate aircraft in TCAs/TRSAs as required by FAA Handbook 7110.65.

VFR MILITARY TRAINING ROUTES (VR)— Routes used by the Department of Defense and associated Reserve and Air Guard units for the purpose of conducting low-altitude navigation and tactical training under VFR below 10,000 feet MSL at airspeeds in excess of 250 knots IAS.

VFR NOT RECOMMENDED— An advisory provided by a flight service station to a pilot during a preflight or inflight weather briefing that flight under visual flight rules is not recommended. To be given when the current and/or forecasted weather conditions are at or below VFR minimums. It does not abrogate the pilot's authority to make his own decision.

VIDEO MAP— An electronically displayed map on the radar display that may depict data such as airports, heliports, runway centerline extensions, hospital emergency landing areas, NAVAIDS and fixes, reporting points, airway/route centerlines, boundaries, handoff points, special use tracks, obstructions, prominent geographic features, map alignment indicators, range accuracy marks, minimum vectoring altitudes.

VISIBILITY— The ability, as determined by atmospheric conditions and expressed in units of distance, to see and identify prominent unlighted objects by day and prominent lighted objects by night. Visibility is reported as statute miles, hundreds of feet or meters. (Refer to FAR Part 91, AIM)

1. Flight Visibility—The average forward horizontal distance, from the cockpit of an aircraft in flight, at which prominent unlighted objects may be seen and identified by day and prominent lighted objects may be seen and identified by night.

ICAO—Flight Visibility—The visibility forward from the cockpit of an aircraft in flight.

2. Ground Visibility—Prevailing horizontal visibility near the earth's surface as reported by the United States National Weather Service or an accredited observer.

ICAO—Ground Visibility—The visibility at an aerodrome as reported by an accredited observer.

3. Prevailing Visibility—The greatest horizontal visibility equaled or exceeded throughout at least half the horizon circle which need not necessarily be continuous.
4. Runway Visibility Value/RVV—The visibility determined for a particular runway by a transmissometer. A meter provides a continuous indication of the visibility (reported in miles or fractions of miles) for the runway. RVV is used in lieu of prevailing visibility in determining minimums for a particular runway.
5. Runway Visual Range/RVR—An instrumentally derived value, based on standard calibrations, that represents the horizontal distance a pilot will see down the runway from the approach end. It is based on the sighting of either high intensity runway lights or on the visual contrast of other targets whichever yields the greater visual range. RVR, in contrast to prevailing or runway visibility, is based on what a pilot in a moving aircraft should see looking down the runway. RVR is horizontal visual range, not slant visual range. It is based on the measurement of a transmissometer made near the touchdown point of the instrument runway and is reported in hundreds of feet. RVR is used in lieu of RVV and/or prevailing visibility in determining minimums for a particular runway.
   a. Touchdown RVR—The RVR visibility readout values obtained from RVR equipment serving the runway touchdown zone.
   b. MID RVR—The RVR readout values obtained from RVR equipment located midfield of the runway.
   c. Rollout RVR—The RVR readout values obtained from RVR equipment located nearest the rollout end of the runway.

ICAO—Runway Visual Range—The maximum distance in the direction of takeoff or landing at which the runway or the specified lights or markers delineating it can be seen from a position above a specified point on its centerline at a height corresponding to the average eye-level of pilots at touchdown.

VISUAL APPROACH— An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

ICAO—VISUAL APPROACH—An approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed in visual reference to terrain.

VISUAL APPROACH SLOPE INDICATOR— (See Airport Lighting)

VISUAL DESCENT POINT/VDP— A defined point on the final approach course of a nonprecision straight-in approach procedure from which normal descent from the MDA to the runway touchdown point may be commenced, provided the approach threshold of that runway, or approach lights, or other markings identifiable with the approach end of that runway are clearly visible to the pilot.

VISUAL FLIGHT RULES/VFR— Rules that govern the procedures for conducting flight under visual conditions. The term "VFR" is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan. (See Instrument Flight Rules, Instrument Meteorological Conditions, Visual Meteorological Conditions) (Refer to FAR Part 91, AIM)

VISUAL HOLDING— The holding of aircraft at selected, prominent, geographical fixes which can be easily recognized from the air. (See Hold, Holding Fixes)

VISUAL METEOROLOGICAL CONDITIONS/VMC— Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima. (See Instrument Flight Rules, Instrument Meteorological Conditions, Visual Flight Rules)

VISUAL SEPARATION— A means employed by ATC to separate aircraft in terminal areas. There are two ways to effect this separation:

1. The tower controller sees the aircraft involved and issues instructions, as necessary, to ensure that the aircraft avoid each other.
2. A pilot sees the other aircraft involved and upon instructions from the controller provides his own separation by maneuvering his aircraft as necessary to avoid it. This may involve following another aircraft or keeping it in sight until it is no longer a factor. (See See and Avoid) (Refer to FAR Part 91)

VORTAC/VHF OMNIDIRECTIONAL RANGE/TACTICAL AIR NAVIGATION— A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance measuring equipment (DME) at one site. (See Distance Measuring Equipment, Navigational Aid TACAN, VOR) (Refer to AIM)

VORTICES/WING TIP VORTICES— Circular patterns of air created by the movement of an airfoil through the air when generating lift. As an airfoil moves through the atmosphere in sustained flight, an area of area of low pressure is created above it. The air flowing from the high pressure area to the low pressure area around and about the tips of the airfoil tends to roll up into two rapidly rotating vortices, cylindrical in shape. These vortices are the most predominant parts of aircraft wake turbulence and their rotational force is dependent upon the wing loading, gross weight, and speed of the generating aircraft. The vortices from medium to heavy aircraft can be of extremely high velocity and hazardous to smaller aircraft. (See Aircraft Classes Wake Turbulence) (Refer to AIM)

VOR/VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION— A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the National Airspace System. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature. Voice features may be used by ATC or FSS for transmitting instructions/information to pilots. (See Navigational Aid) (Refer to AIM)

VOT/VOR TEST SIGNAL— A ground facility which emits a test signal to check VOR receiver accuracy. Some VOT's are available to the user while airborne, and others are limited to ground use only. (Refer to FAR Part 91, AIM, Airport/Facility Directory)

WAKE TURBULENCE— Phenomena resulting from the passage of an aircraft through the atmosphere. The term includes vortices, thrust stream turbulence, jet blast, jet wash, propeller wash and rotor wash, both on the ground and in the air. (See Aircraft Classes, Jet Blast, Vortices) (Refer to AIM)

WARNING AREA— See Special Use Airspace.

WAYPOINT— (See Area Navigation)

WEATHER ADVISORY/INFLIGHT WEATHER ADVISORY— (See SIGMET, AIRMET)

WEATHER ADVISORY/WS/WST/WA/CWA— In aviation weather forecast practice, an expression of hazardous weather conditions not predicted in the area forecast, as they affect the operation of air traffic and as prepared by the NWS.

WHEN ABLE— When used in conjunction with ATC instructions, gives the pilot the latitude to delay compliance until a condition or event has been reconciled. Unlike "pilot discretion," when instructions are prefaced "when able," the pilot is expected to seek the first opportunity to comply. Once a maneuver has been initiated, the pilot is expected to continue until the specifications of the instructions have been met. "When able," should not be used when expeditious compliance is required.

WILCO— I have received your message, understand it, and will comply with it.

WIND SHEAR— A change in wind speed and/or wind direction in a short distance resulting in a tearing or shearing effect. It can exist in a horizontal or vertical direction and occasionally in both.

WORDS TWICE—

1. As a request: "Communication is difficult. Please say every phrase twice."
2. As information: "Since communications are difficult, every phrase in this message will be spoken twice."

APPENDIX B
AIRCRAFT WEIGHT CLASSES AND GROUPS

Manufacturer/Model	Type Designator		Weight Class/ Group
	Civil	Military	
Aeronca (USA)			
Aeronca Champion	AR58		S/2
Chief/ Super Chief	AR11		S/2
Sedan	AR15		S/2
Aero Spaceline (USA)			
Guppy	AP52		L/5
Mini Guppy	AP3M		L/5
Pregnant Guppy	AP1P		L/5
Super Guppy/ Turbine	AP25/ AP45		L/5
Aerospatiale (France)			
Caravelle	S210		L/4
Concorde	CONC		H/5
Corvette SN601	S6001		L/3
Rallye MS 880/ 881/ 883	S880		S/3
Rallye Commodore MS 892.	S892		S/2
Rallye Minerva MS 894	S894		S/2
Twin Star	S355		S/2
Airbus Industries (International)			
Airbus	A300		H/5
Alon, Inc. (USA)			
Aircoupe A2	F02		S/2
Andrie Tupolev (USSR)			
Tu-114	TU114		H/5
Tu-144	TU144		H/5
Antonov (USSR)			
AN-10	AN10		L/4
AN-12	AN12		L/5
Avro (A. V. Roe) (U.K.)			
Anson	AV52		L/3
CF-100		CF00	L/4
Lancaster	LANC		L/4
Shackleton		SHC3	L/4
Beagle Aircraft (U.K.)			
Airdale	BT10		S/2
Model 206S	BT6S		S/3
Beech Aircraft (USA)			
Airliner	BE99		S/2
Baron	BE55	T42	S/2
Baron 58	BE58		S/2
Bonanza 33	BE33		S/2
Bonanza35	BE35		S/2
Bonanza 36	BE36		S/2
Duke	BE60		S/3
Duchess	BE76		S/2
King Air 90	BE90	U21	S/2
King Air 100	BE10		S/3
Mentor	BE45	T34	S/2
Queen Air 65/ A65/ 70	BE65		S/2
Queen Air 89	BE80		S/2
Seminole		U8	S/2
Sierra 24	BE24		S/2
Skipper 77	BE77		S/2
Sport 19	BE19		S/2
Stagger Wing	BE17		S/2
Sundowner	BE23		S/2
Super H18	BE8S		S/2
Super King Air 200	BE20	C12	S/3
Super Queen 88	BE88		S/2
Travelair	BE95		S/2
Twin Beech 18	BE18	C45	S/2
Twin Bonanza	BE50		S/2
Bellanca Aircraft (Includes Downer/ Northern) (USA)			
Citabria	CH10		S/2
Citabria 7ECA	CH9		S/2
Cruisair Sr./ Cruisemaster 14—19.	BL14		S/2
Decathlon	BL30		S/2
Scout	BL28		S/2
Viking	BL26		S/2
Boeing Aircraft (USA)			
707 100/200	B707		L/5
707 300/400	H/B707		H/5
720	B720		L/5
720B	B72S		L/5
727	B727		L/4
737	B737	T43	L/4
747	B747	E4A	H/5A
747SP	B74S		H/5
757	B757		L/4
767	B767		H/5
AWACS		E3A	H/5
EC135		E135	L/5
Stearman	B75		S/2
Stratofortress		B52	H/5
Stratofreighter		KC97	L/4
Stratolifter B717		C135	L/5
Stratotanker KC135		KC135	L/5
VC37B		C137B	L/5
VC37C		C137C	H/5
YC14		YC14	L/4
Bristol Aircraft (U.K.)			
Britannia 310	BR31		L/5
British Aerospace Corp. (U.K.)			
BAC111	BA11		L/4
BAC 111	BA11		L/4
BAC 146/ 200	BA46		L/4
Harrier		AV8*	L/4
HS/DH 125—600/ 700	HS25		L/3
HS 748 Series	HS748		L/4
Super VC 10	BA15	VC15	H/5
Trident	HS21		L/4
Vanguard	VC9		L/4
VC 10	BA10	VC10	H/5
Viscount	VC7		L/4
Vulcan		VLCN	H/4
Britton Norman Ltd. (U.K.)			
Islander	BN2		S/2
Trislander-Mark 3	BN3		S/2
Bushmaster Aircraft Corp. (USA)			
Bushmaster 2000	BU20		L/3
Camair (USA)			
Model 480 (Twin Navion)	CM48		S/3

Manufacturer/Model	Type Designator		Weight Class/ Group
	Civil	Military	
Yukon	CC06		L/4
Candair Ltd. (Canada)			
Argus	CL28	CP07	L/4
Challenger	CL60		L/4
Cosmopolitan, (Convair 540).	CL66/ CV54	CC009	L/4
North Star	NSTR		L/4
Starfighter	CF04	F104*	L/5
Yukon (Freightliner)	CL44	CC06	L/5
Cessna Aircraft (USA)			
120	C120		S/2
140	C14		S/2
150	C150		S/2
152	C152		S/2
170	C170		S/2
172 Skyhawk	C172	T41	S/2
175 Skylark	C175		S/2
177 Cardinal	C177		S/2
180	C180		S/2
182	C182		S/2
185 Skywagon	C185		S/2
188 Agwagon	C188		S/2
190	C190		S/2
195	C195		S/2
205	C205		S/2
206	C206		S/2
207 Super Skywagon	C207		S/2
210	C210		S/2
Crusader	C303		S/2
305/ 321 Bird Dog	C305	O1	S/2
310	C310	U3	S/2
318		T37*	S/2
318E Dragonfly		A37*	S/2
320 Skynight	C320		S/2
336 Skymaster	C336		S/2
Super Skymasterr	C337	O2	S/2
340	C340		S/2
401	C401		S/2
402	C402		S/2
411	C411		S/2
414	C414		S/2
421	C421		S/2
Corsair	C425		S/2
441	C441		S/2
Citation I/ II	C500		S/3
Citation III	C50S		S/3
Champion Aircraft Corp. (USA)			
Challenger	CH8		S/2
Lancer 402	CH40		S/2
Traveler/ Tri-Traveler	CH7		S/2
Construcciones Aeronauticas (Spain)			
Model 212	CA21		L/2
Curtis Wright (USA)			
Commando	CW46	C46	L/3
Dassault (France)			
Falcon 10	DA10		L/3
Falcon 20	FFJ	HU25	L/3
Falcon 50	DA50		L/3
Mercure	DA01		L/5
Mercure 200	DA02		L/5
DeHavilland (Canada & U.K.)			
Beaver	DH2	U6	S/2
Buffalo	DH5	C8	L/3
Caribou	DH4	C7A	L/3
Chipmonk	DH1		S/2
Comet 2	DH62		L/5
Comet 4	DH64		L/5
Dash 7	DH7		L/2**
Dove (Devon)	DH10		S/2
Heron	DH11		S/2
Otter	DH3	U1	S/2
Turbo Beaver	DH2T		S/2
Twin Otter	DH6	U18	S/2
Dornier GmbH (West Germany)			
Dornier 27	DO27		S/3
Dornier 28	DO28		S/3
Embraer (Brazil)			
Bandeirante	E110		S/3
Fairchild Industries (USA)			
A10		A10A*	L/4
Cornell	FA62		S/2
FH227	FA22		L/3
Friendship F27	FA27		L/3
Flying Box Car	FA24	C119	L/4
Pilatus/ Peacemaker	PL6	AV23A	S/1
Provider		C123	L/4
Thunderchief		F105*	L/5
Fokker-VFW BV (Netherlands)			
(See VFW-Fokker)			
Foxjet International (USA)			
ST/600	FXJ		S/2
Gates Learjet Corp. (USA)			
23	LR23		S/3
24	LR24		L/3
25	LR25		L/4
35	LR35	C21	L/4
36	LR36		L/4
55	LR55		L/4
General Dynamics Corp. (USA)			
Canso/ Catalina	CV14	PBY5	L/4
Convair 240	CV24		L/4
Convair 440	CV44		L/4
Convair 580	CV58		L/4
Convair 600	CV60		L/4
Convair 640	CV64		L/4
Convair 880	CV88		L/5
Convair 990	CV99		L/5
Delta Dagger		F102*	L/5
Delta Dart		F106*	L/5
F16A/B		F16*	L/5
F111/ FB111		F111*	L/5
Liner/ Samaritan	CV34	C131	L/4
Privateer		P4	L/4
Valiant 34	CV13		S/3
Grumman Aerospace Corp. (USA)			
Ag-Cat	G164		S/2
Albatross	G64	U16	L/3
American	AA1		S/2
American Tr-2	AA2		S/2
Cheetah/ Tiger	AA5		S/2
Cougar	GA7		S/2
Cougar G93		F9*	L/5
Goose/ Super Goose	G21		L/3
Greyhound		C2	L/4
Hawkeye		E2	L/5
Intruder		A6*	L/5
Mallard	G73		L/3
Mohawk	G134	OV1	S/3
Tiger		F11*	L/5
Tomcat		F14*	L/5
Tracer		E1	L/4
Tracker	G89	S2	L/4

Manufacturer/Model	Type Designator		Weight Class/ Group
	Civil	Military	
Trader		C1	L/4
Widgeon/ Super Widgeon.	G44		L/3
Gulfstream Aerospace Corporation (USA)			
Gulfstream I	G159	VC4	L/4
Gulfstream II	G2	VC11	L/4
Gulfstream III	G3	C20	L/4
Hadley Page (U.K.)			
Jetstream	HP13		S/3
Hamburger Flugzeubau (West Gerrmany)			
Hansajet	HF32		L/3
Hamilton Aviation (USA)			
Westwind	WSW		S/3
Helio Aircraft Co. (USA)			
Courier	HE1		S/1
Stallion	HE5	AU24	S/1
Super Courier/ Tri-Courier.	HE3	U10	S/1
Howard Aero Mfg. (USA)			
Model 500 (WARO)	HW5		L/4
Ilyushin (USSR)			
IL-18	IL18		L/5
IL-38	IL38		L/4
IL-62	IL62		H/5
IL-76	IL76		H/5
Israel Aircraft Industries, Ltd. (Israel)			
Arava 101	RV01		L/3
Arava 201	RV02		L/3
Westwind 1123	WW23		L/4
Westwind 1124	WW24		L/4
Lake Aircraft (USA)			
LA-4-200 Buccaneer	LA4		S/2
Learavia Inc. (USA)			
Lear Fan	LRF		S/2
Lockheed Aircraft Corp. (USA)			
Constellation (649)	L649		L/5
Constellation (749)	L749	C121	L/5
Electra	L188		L/4
Galaxy		C5A	H/5
Hercules	L100	C130	L/4
Jetstar	L329	C140	L/4
Lodestar	L18		L/3
Neptune		P2	L/4
Orion		P3	L/4
Reconnaissance		SR71*	L/5
Sea Star		T1*	L/5
Shooting Star		T33*/ F80*	L/4
Starfighter		F104*	L/5
Starlifter		C141	H/5
Starliner	L164		L/5
Super Constellation	L49		L/5
Tri-Star	L101		H/5
U2		U2*/TR-1*	S/5
Viking		S3A	L/4
YF12A		F12	L/4
Martin Co. (Division of Martin-Marietta Corp.) (USA)			
202	M202		L/3
404	M404		L/3
Canberra		B57*	L/5
Maule			
M4/5	ML4		S/2
McDonnell-Douglas Aircraft (USA)			
DC-6B	DC6B		L/4
DC-7/7B	DC7		L/5
DC-8	DC8		L/5
DC-9	DC9	C9	L/4
DC-9/ MD-80 Series	MD80		L/4
DC-10	DC10		H/5
Eagle		F15*	L/5
Invader		B26	L/4
Liftmaster	DC6	C118	L/4
Phantom II		F4*	L/4
Seven Seas/ Speed Freighter.	DC7C		L/5
Skyhawk		A4*	L/5
Skymaster	DC4	C54	L/4
Skynight		F10*	L/5
Skyraider		A1*	L/4
Skytrain	DC3	C47	L/3
Skywarrior		A3*	L/4
Super DC3	DC3S	C117	L/3
Super DC8 30/40/50	H/DC8		H/5
Super DC8 61/62/63	DC86		H/5
Voodoo		F101*	L/5
YC15		YC15	L/3
Messerschmitt (West Germany)			
Monson	ME29		S/2
Mitsubishi (Japan)			
Marquise/ Solitaire	MU2		S/2
Diamond 1	MU3		L/3
Mooney Aircraft Co. (USA)			
Mark 10	MO10		S/2
Mark 20	MO20		S/2
Mark 21	MO21		S/2
Mark 22	MO22		S/2
Navion Aircraft Co. (USA)			
Range Master	NA1		S/2
Nihon Aeroplane Mfg. Co. (Japan)			
Model YS11	YS11		L/3
Noorduyn Norseman (Canada)			
Norseman MK (IV)	NY4		S/2
Norseman MK (V)	NY5		S/2
Nord Aviation (France)			
Martinet NC701/02		MART	L/3
Nortalas 25C1		NORD	L/3
Super Broussard 260/ 262.	ND26		L/3
Transall C160	ND16		L/3
Northrop (USA)			
F18		F18*	L/5
Talon		T38*	S/5
Tiger/ Freedom Fighter		F5*	L/5
Piaggia & Co. (Italy)			
Royal Gull	P136		S/2
Super Gull	P166		S/2
Vespa Jet	P808		L/3
Pilatus Aircraft (Switzerland)			
Pilatus Porter	PL6		S/1
Turbo Porter	PL6A		S/1
Piper Aircraft (USA)			
Aerostar 700 Series	PA60		S/2
Apache	PA23		S/2
Aztec	PAZT	U11	S/2
Brave	PA36		S/2
Cherokee	PA28		S/2

Manufacturer/Model	Type Designator Civil	Type Designator Military	Weight Class/ Group
Cherokee Arrow (R)	PARO		S/2
Cherokee Six/ Lance/ Saratoga.	PA32		S/2
Cheyenne I/II	PAYE		S/3
Cheyenne III/ IV	PA42		S/3
Chieftan	PA31		S/2
Clipper	PA16		S/2
Commanche	PA24		S/2
Cruiser	PA5		S/2
Cub Special	PA11		S/2
Cub Trainer	PA2		S/2
Family Cruiser	PA14		S/2
Malibu	PA46		S/2
Mohave	PA31		S/2
Navajo	PA31		S/2
Pacer	PA20		S/2
Pawnee	PA25		S/2
Seminole	PA44		S/2
Seneca	PASE		S/2
Super Cruiser	PA12		S2
Super Cub	PA18	U7	S/2
Tomahawk	PA38		S/2
Tri-Pacer/ Colt Caribbean.	PA22		S/2
Twin Commanche	PA30/ 39		S/2
Vagabond Trainer	PA15		S/2
Vagabond	PA17		S/2
Riley Aeronautics (USA)			
Model 65/ Rocket	RY65		S/2
Turbo-Executive	RY40		S/2
Rockwell International (USA)			
Aero Commander 112	AC12		S/2
Aero Commander 685	AC85		S/2
Alt-Cruiser	AC72		S/3
Bronco		OV10*	L/3
Buckeye T-20		T2*	L/5
Commander 112A	AC2A		S/2
Commander 112TC	AC2T		S/2
Commmander 114	AC14		S/2
Commander (200)	MY20		S/2
Commander (500)	AC50		S/2
Commander (520)	AC52		S/2
Commmander (560)	AC56	U9	S/2
Darter (100/150)	AC10		S/2
Grand Commander (680FL).	AC60		S/2
Jet Commander	AC21		L/3
Lark	LARK		S/2
Mitchell		B25	L/3
Navion	N145		S/2
Sabre		F86*	L/5
Sabreliner	N265	T39	L/3
Super Commander (680S)	AC68	U4	S/2
Super Sabre		F100*	L/5
Texan	N6	T6	S/2
Trojan		T28	S/2
Turbo Commander	AC6T		S/2
Vigilante		A5*	L/5
Scottish Aviation (U.K.)			
Pioneer	SCP		S/2
Twin Pioneer	SCPT		S/2
Short (U.K.)			
Belfast	SH5	SC5	L/5
Short	SHD3		L/3
Skyvan	SH7		S/3
Silvaire (USA)			
Luscombe	SL8		S/2
Stinson (USA)			
Reliant (Vultee)	ST77		S/2

Manufacturer/Model	Type Designator Civil	Type Designator Military	Weight Class/ Group
Voyager/ Station Wagon (105/108).	ST75		S/2
Sud Aviation (France)			
Caravella	S210		L/4
Swearingen Aviation (USA)			
Merlin IIA	SW2		S/3
Merlin IIB	SW3		S/3
Merlin IV/ Metro	SW4		S/3
Taylorcraft (USA)			
Sportsman 19	TC19		S/2
Topper 20A	TC20		S/2
Tourist 15A	TC15		S/2
VFW-Fokker (West Germany)			
FH227	FK22		L/3
Friendship	FK27		L/3
Fellowship	FK28		L/4
VFW 314	VF14		L/3
Vought (USA)			
Corsair II		A7*	L/5
Crusader		F8*	L/5
Swift	TE1		S/2

HELICOPTERS

Manufacturer/Model	Type Designator Civil	Type Designator Military	Weight Class/ Group
Aerospatiale (France)			
Lama	HR15		S/1
Alouette II	HR30		S/1
Aloutte III	HR60		S/1
Dauphin	HR36		S/1
Ecurevil/ Astar	HR35		S/1
Gazelle	HR34		S/1
Puma	HR33		L/2
Super Frelon	HR32		L/2
Bell Helicopter (Textron) (USA)			
Biglifter	BH14		L/2
Cobra	BH09	AH1	S/1
Jet Ranger/ Long Ranger/ Sea Ranger/ Kiowa.	BH06	H58/ 57	S/1
Iroquois	BH04	UH-1H	S/1
Model 205 A-1	BH05		S/1
Sea Cobra		AH-1T	L/2
Sioux	BH13	H13	S/1
Twin Huey	BHTH	UH-1N	S/1
Boeing Vertol Co. (USA)			
Chinook	HV47	CH47	L/2
Model 105	B105		S/1
Sea Knight	HV07	CH46	L/2
Brantley-Hynes Helicopter, Inc. (USA)			
Model B-2A/B -2B	HB42		S/1
Model 305	HB43		S/1
Breda Nardi Costruzioni (Italy)			
Model 269C	NH30		S/1
Model 369D	NH50		S/1
Costruzioni Aeronautiche, Agusta (Italy)			
Model 4JT-3B1	A4JT		S/1
Model A109	A109		S/1
Model 212 ASW	A212		S/1
Enstrom Corp. (USA)			
Executive	HF28		S/1
Shark	HF80		S/1
Turbo-Shark	HF8C		S/1
Fairchild/ Republic (USA)			
L3/ SL3	HH3		S/1
L4/ SL4	HH4		S/1
Raven	HH12	H23	S/1

Manufacturer/Model	Type Designator		Weight Class/ Group
	Civil	Military	
Hughes Helicopters Div. of Summa Corp. (USA)			
AAH	HU64	YAH64	L/2
Model 269/ 300	HU30		S/1
Osage		H55	S/1
Pawnee 369/500	HU50	H6	S/1
Kaman Aircraft Corp. (USA)			
Huskie 600-3/5	HK60	H43	L/2
Seasprite		H2	L/2
Kawasaki Heavy Industries, Ltd. (Japan)			
Model BK-117	HK17		S/1
Messerschmidtt-Boelkow-Blohm (West Germany)			
Model BO 105	HM05		S/1
Model BK 117 (Kawasaki).	HK17		S/1
Panstwowe Zaklady Lotnicze (Poland)			
Model SM-1W/2	HZ1		S/1
Model Mi-2/2M	HZ2		S/1

Manufacturer/Model	Type Designator		Weight Class/ Group
	Civil	Military	
Robinson Helicopter, Inc. (USA)			
Model R22	HR22		S/1
Sikorsky Aircraft (USA)			
Black Hawk S-70	SK70	H60	L/2
Chickasaw S-55	SK55	H19	S/1
Choctaw S-58 Seashore/ Seaboat.	SK58	H34	L/2
Lamps MK3		SH60	L/2
Model S-51	SK51		L/2
Model S-52	SK52		L/2
Model S-59	SK59		L/2
Model S-62	SK62	H52	S/1
Model S-69	SK69	H59	S/1
Model S-76	SK76		S/1
Mojave S-56	SK56	H37	L/2
RSRA S-72	SK72		L/2
Sea King S-61	SK61	H3	L/2
Sea Stallion S-65	SK65	H53	L/2
Skycrane S-64 E/F	SK64		L/2
Tarhe S-64		H54	L/2
Silvercraft (Italy)			
Model SH-4	HS4		S/1

NOTE: The weight class listings in this appendix are to be used for wake turbulence separation purposes only. The aircraft groups are general.

* Indicates single-piloted military turbojet aircraft.

** DeHavilland Dash 7 authorized 2,000 feet with letter of agreement and 7½° glide slope.

When the weight class cannot be determined from this appendix, obtain gross weight from pilot and use the appropriate weight class designator.

Groups are based on FAA-certificated stopping distance and/or manufacturer's published performance data.

APPENDIX C
STANDARD OPERATING PRACTICE (SOP) FOR TRANSFER OF RADAR IDENTIFICATION AND ASSOCIATED COORDINATION

1. PURPOSE

This appendix defines the terms and functions used in coordination associated with the transfer of radar identification, and prescribes a structured step-by-step process to be used as a norm when transferring radar identification from one controller to another. The specific step-by-step process is contained with explanatory notes.

2. BACKGROUND

In the past, the contents, methods, and practices used in coordination associated with conducting a transfer of radar identification varied among personnel. Pertinent information was often not exchanged or not completely understood. The confusion often created unnecessary increases in workload and decreases in operational efficiency. The major causes of confusion were the unrecognized differences in the meanings of terms and the inconsistency in requests and acknowledgments during coordination. The definitions and structured processes contained in this SOP have been established to enhance operational effectiveness and to facilitate the exchange of information when transferring radar identification.

The information contained in this appendix was initially developed by active air traffic controllers and first-line supervisors. The product generated by these workgroups was taken into the field and tested in a live traffic environment. Additionally, changes and recommendations from controllers at the test sites were compiled and, where warranted, incorporated into the SOP. This appendix DOES NOT in any way attempt to take flexibility or controller judgement away from the air traffic controller. The controller must still decide which action is applicable and which option to take in response to each action. The appendix only says that after controllers decide which action to initiate, they shall follow the guidelines and step-by-step processed as outlined.

3. GENERAL

a. *HANDOFF.* The SOP for the handoff action prescribes nothing essentially new although the specific step-by-step process may be new to some controllers.

The SOP allows for the action to begin as an intended handoff. The receiving controller has the options of accepting the handoff, accepting with restrictions, or denying the handoff by saying "unable." In the case of denial, time permitting, the receiving controller should state the reasons for denial. Should it be necessary to reinitiate the action later, the initiating controller should repeat the step-by-step process from the beginning.

b. *POINT OUT.* The radar point out function was incorporated into the system as a means of reducing frequency changes and expediting traffic. This function permits one controller to transfer the radar identification of an aircraft to another controller, request approval for an aircraft to enter the other controller's airspace, and retain radio contact with the aircraft. It was designed for use only when an aircraft would be in another controller's airspace for a short period of time. The present SOP was established to clarify and standardize the meaning and usage of "point out" and to document the related step-by-step process of controller-to-controller actions and communications. The term "point out" in the SOP refers to the case when the aircraft will or may enter another controller's airspace for a short period of time. The controller who initiates the point out is requesting approval to (1) enter the other controller's airspace, and (2) retain radio contact with the aircraft.

The point out action in this SOP is to be used only when it is opperationally acceptable and an expeditious alternative to the handoff action. Therefore, point out is prescribed to cover exceptions to a controller's usual actions. If points outs occur frequently in a particular part of a controller's airspace, the airspace configuration, or the procedure, or both may need to be examined and modified to reduce or eliminate the need for point out instead of handoff. If examination indicates point out actions are preferable to handoff actions, then a special procedure and written agreement may be needed.

Point out is not to be used as an alternative to handoff when the receiving controller considers a handoff to be preferred. The step-by-step process allows the receiving controller to approve the point out as coordinated, approve with restrictions, convert the point out to a handoff, or report that he is unable to accomodate at all by saying "unable." If unable, time permitting, the receiving controller should state the reason. Should it be necessary to reinitiate the action later, the intiating controller should repeat the step-by-step process from the beginning.

The point out is the initiating controller's request for the two controllers to agree on what is to be done. A point out shall always be accomplished by voice coordination. The receiving controller shall withhold the term "point out approved" until the coordination is completed.

The receiving controller is discouraged from answering a point out with lengthy or cumbersome restrictions. If the receiving controller issues lengthy or cumbersome restrictions, the required coordination is likely to be more time consuming and less desirable than a handoff.

The two controllers involved are required to make this judgement in each case. They should remember that point out is an exception to the routine handoff action and is prescribed only when it is operationally advantageous.

c. *TRAFFIC.* It is common practice to transfer radar identification of an aircraft by issuing traffic in conjunction with a handoff or point out.

The issuance of traffic with appropriate restrictions requires voice coordination in order to ensure separation of the aircraft involved. The required coordination is likely to be more time consuming and less desirable than issuing other restrictions. The issuance of "traffic" with appropriate restrictions instead of issuing other restrictions should only be used when it will provide an operational advantage. The controllers involved are required to make this judgment in each case. It must be emphasized that when using the term "traffic" for coordinating separation, the controller issuing traffic shall issue appropriate restrictions. Because "traffic" restrictions are issued with respect to an aircraft rather than a point in space, the controller accepting the restrictions shall be responsible for ensuring that approved separation is maintained between the involved aircraft. Specific examples and details of "traffic" restrictions are presented in Note 11, located at the end of this SOP.

4. STEP-BY-STEP PROCESS

a. The following pages contain the step-by-step process for carrying out the actions described in this Appendix.

b. To make the step-by-step process more understandable and easier to read, the following points are explained:

(1) Some steps contain footnotes in parenthesis; e.g., (2), (3), etc., that refer to notes which explain the action taken in that step. (These notes are found in the back of this Appendix.)

(2) Aircraft position is the distance and bearing of the aircraft from a fix, map symbol, or radar target known and displayed by both the receiving and transferring controllers.

(3) Aircraft identification refers to any accepted method for labeling the aircraft; e.g., aircraft identification or beacon code.

(4) Altitude information should include whether the aircraft is climbing or descending, the assigned altitude, and any altitude restrictions. Altitude information may be omitted when letters of agreement or facility directives ensure that the altitude information will be known by the receiving controller.

c. *HANDOFF (physical).*

Initiating Controller—	*Receiving Controller—*
(1) Move to appropriate position and manually point to the aircraft's location on the receiving controller's scope.	
(2) Wait for indication that the receiving controller is ready.	
	(3) Indicate when ready.
(4) Say, "Handoff," state aircraft identification and altitude information. (Communicate other pertinent information at this time.)(1)	
	(5) Look for target and establish radar identification.

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, than all "(c)" parts, etc. Example: Read (6)(a), (7)(a), (8)(a), etc.; then (6)(b), (7)(b), (8)(b), etc.

	(6)(a) State aircraft identification. Say, "Radar Contact" and, if appropriate, take action to label target. (2)(3)
	(b) State aircraft identification and state restrictions. Say, "Radar Contact" and if appropriate, take action to label target. (2)(3)(11a)
	(c) State aircraft identification. Say, "Unable." (9a)
(7)(a) Cease pointing.	
(b) Cease pointing. (4)	
(c) Cease pointing.	

BOTH CONTROLLERS MARK STRIPS OR MAKE THEIR NOTES, AS REQUIRED, AT THE END OF EACH PROCESS. (5)

d. *HANDOFF (interphone).*

Initiating Controller—	*Receiving Controller—*
(1) Make interphone connection to receive controller's position.	
(2) Listen to ensure that the interphone circuit is not in use and that the receiving controller is not delivering or receiving a voice message.	
(3) State intended receiving controller's position identification, initiating controller's position identification, and line number if required. Say "Handoff."	
	(4) State receiving controller's position identification. (6)

(SEE NOTE (10) FOR ALTERNATE CALL-UP PROCESS)

(5) State aircraft position, identification, and altitude information. (Communicate other pertinent information at this time.) (1)	

Initiating Controller—

Receiving Controller—

(6) Look for target and establish radar identification.

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, then all "(c)" parts, etc. Example: Read (7)(a), (8)(a), (9)(a), etc.; then (7)(b), (8)(b), (9)(b), etc.

(7)(a) Read back aircraft identification. Say, "Radar Contact," state operating initials, and, if appropriate, take action to label target. (2)(3)

(b) Read back aircraft identification, state restrictions. Say, "Radar Contact," state operating initials, and if appropriate, take action to label target. (2)(3)(11a)

(c) Read back aircraft identification. Say, "Unable," and state operating initials. (9a)

(8)(a) State operating initials and release the line.

(b) State operating initials and release the line. (4)

(c) State operating initials and release the line.

BOTH CONTROLLERS MARK STRIPS OR TAKE OTHER NOTES, AS REQUIRED, AT THE END OF EACH PROCESS. (5)

e. *HANDOFF (automated).*

Initiating Controller—

Receiving Controller—

(1) Take action to place the data block on receiving controller's display. (7) (Ensure that the data block is associated with the appropriate target.)

This action is not required where directives permit computer-generated handoff.

For ease of reading the following steps, read all parts "(a)" as one integrated process, then read all "(b)" as parts another process, then all "(c)" parts, etc. Example: Read (2)(a), (3)(a), (4)(a), etc.; then (2)(b), (3)(b), (4)(b), etc. "No action prescribed" means the process ended with the preceding step.

(2) When data block is observed:

(a) Take action to accept handoff.

(b) To place restrictions, make interphone connection to initiating controller's position, listen to insure that the interphone circuit is not in use and that the initiating controller is not delivering or receiving a voice message, state initiating controller's position identification, receiving controller's position identication, and line number if required. (10)(11a)

(c) If unable, follow interphone steps in (2)(b) above.

(3)(a) No action prescribed.

(b) State initiating controller's position identification. (6)(10)

(c) State initiating controller's position identification. (6)(10)

Initiating Controller—	*Receiving Controller—*
	(4)(b) State aircraft identification and state restrictions. (c) State aircraft identification. Say, "Unable," and state operating initials. (9a)
(5)(b) State operating initials and release the line. (4) (c) State operating initials and release the line.	
	(6)(b) State operating initials, release the line, and take action to accept handoff. (c) Release the line.

BOTH CONTROLLERS MARK STRIPS OR MAKE OTHER NOTES, AS REQUIRED, AT THE END OF EACH PROCESS (5)

f. *POINT OUT (physical).*

Initiating Controller—	*Receiving Controller—*
(1) Move to appropriate position and manually point to the aircraft's location on the receiving controller's scope. (2) Wait for indication that the receiving controller is ready.	
	(3) Indicate when ready. I03(4) Say "Point Out," state aircraft identification, altitude, and route information. (Communicate other pertinent information at this time.)(1) (5) Look for target and establish radar identification.

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, then all "(c)" parts, etc. Example: Read (6)(a), (7)(a), (8)(a), etc.; then (6)(b), (7)(b), (8)(b), etc.

Initiating Controller—	*Receiving Controller—*
	(6)(a) State aircraft identification. Say, "Point Out Approved," and if appropriate, take action to label target. (2)(3) (b) State aircraft identification and state restrictions. Say, "Point Out Approved," and if appropriate, take action to label target. (2)(3)(11a) (c) State aircraft identification. Say, "Handoff, Radar Contact," and if appropriate, take action to label target. (2)(3) (d) Read back aircraft identification. Say, "Unable." (9a)
(7)(a) Cease pointing. (b) Cease pointing. (c) Cease pointing. (d) Cease pointing.	

BOTH CONTROLLERS MARK STRIPS OR MAKE OTHER NOTES, AS REQUIRED. (5)

READEX FICHE

g. *POINT OUT (interphone)*

Initiating Controller—

Receiving Controller—

(1) Make interphone connection to receiving controller's position.

(2) Listen to ensure that the interphone circuit is not in use and that the receiving controller is not delivering or receiving a voice message.

(3) State intended receiving controller's position identification, initiating controller's position identification, and line number, if required. Say, "Point Out."

(4) State receiving controller's position identification. (6)

(SEE NOTE (10) FOR ALTERNATE CALL-UP PROCESS)

(5) State aircraft position, identification, altitude and route information. (Communicate other pertinent information at this time.) (1)

(6) Look for target, and establish radar identification.

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, then all "(c)" parts, etc. Example: Read (7)(a), (8)(a), (9)(a), etc.; then (7)(b), (8)(b), (9)(b), etc.

(7)(a) Read back aircraft identification. Say, "Point Out Approved," and state operating initials. If appropriate, take action to label target. (2)(3)

(b) Read back aircraft identification, and state restrictions. Say, "Point Out Approved," and if appropriate, take action to label target. (2)(3)(11a)

(c) Read back aircraft identification. Say, "Handoff, Radar Contact," state operating initials, and label target. (2)(3)

(d) Read back aircraft identification. Say, "Unable," and state operating initials. (9a)

(8)(a) State operating initials and release the line.

(b) State operating initials and release the line. (4)

(c) State operating initials and release the line.

(d) State operating initials and release the line.

BOTH CONTROLLERS MARK STRIPS OR MAKE OTHER NOTES, AS REQUIRED. (5)

h. *POINT OUT (automated).*

Initiating Controller—

Receiving Controller—

(1) Take action to place the data block on receiving controller's display. (Ensure that the data block is associated with the appropriate target.) (7)

(2) Make interphone connection to receiving controller's position.

Initiating Controller—

(3) Listen to ensure that the interphone circuit is not in use and that the receiving controller is not delivering a voice message.

(4) State intended receiving controller's position identification, and line number if required. Say, "Point Out."

Receiving Controller—

(5) State receiving controller's position identification. (6)

(SEE NOTE (10) FOR ALTERNATE CALL-UP PROCESS)

(6) State aircraft position, identification, altitude, and route information. (Communicate other pertinent information at this time.) (1)

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, then all "(c)" parts, etc. Example: Read (7)(a), (8)(a), (9)(a), etc.; then (7)(b), (8)(b), (9)(b), etc.

(7)(a) When data block is observed, read back aircraft identification. Say, "Point Out Approved," state operating initials. (2)

(b) Read back aircraft identification and state restrictions. Say, "Point Out Approved," state operating initials. (2)(11a)

(c) Read back aircraft identification. Say, "Handoff, Radar Contact," and operating initials. (2)

(d) Read back aircraft identification. Say, "Unable," and state operating initials. (9a)

(8)(a) State operating initials and release the line.

(b) State operating initials and release the line. (4)

(c) State operating initials, release the line, and where appropriate, take action to place handoff on receiving controller's display. (7)(8)

(d) State operating initials, and release the line. (9)

BOTH CONTROLLERS MARK STRIPS OR MAKE NOTES, AS REQUIRED, AT THE END OF EACH PROCESS. (5)

l. *FOOTNOTES.*

(1) This "other pertinent information" for handoff and point out includes that listed in Chapter 5, Section 4, paragraph 5-64f.

(2) The term "Radar Contact" is prescribed exclusively for handoff; "Point Out Approved" is used exclusively with point out; and "Traffic Observed" is used exclusively with the issuance of traffic with appropriate restrictions.

(3) The phrase "label the target" refers to any action which displays the status of the target. For example, marking a shrimp boat, displaying a full data block, or making a computer entry to change the data block are considered as "labeling the target."

(4) It is a common practice to issue restrictions to ensure separation. It is extremely important that these restrictions are clearly understood.

The controller receiving the restriction should either read it back or ask that it be repeated whenever there is any chance of misunderstanding. Should restrictions become too lengthy or cumbersome, an alternative course of action should be used. The controller receiving any coordinated restriction is responsible for complying with those restrictions.

(5) The prescribed time for marking strips or taking notes is that point in the process when it is known which marks should be made: not earlier, to avoid canceling and remaking the mark; not later, to avoid forgetting to make the mark.

(6) If the controller's stated position identification is not that of the intended controller, then the controller initiating the call says, "Disregard," releases the line, and starts the process over.

(7) The action applies only when the automated capability is available.

(8) If the receiving controller looks at the designated target location and sees no handoff or point out display, he says, "No display." The initiating controller says, "Standby," and corrects the action to send the display to the intended receiving controller, who is holding on the line.

(9)(a) When the receiving controller responds to a handoff or a point out by saying "unable," he means he is unable to accept the handoff or the point out for some reason. When this occurs, he should, if time permits, state the reason; i.e., "radar failure," or "frequency failure," or "traffic," etc.

(b) When the controller receiving the appropriate traffic restrictions states "unable," he means he is unable to comply with the restrictions. Normally, alternate instructions should be issued at this time.

(10) The step-by-step process described in this appendix shows the sequence for initial call up when using a voice page line. In facilities where the 300 system communication equipment operates differently or various types of equipment are used, such as dial lines, ziptones, etc., it is permissible for the sequence to be changed after line connection is made. The change shall be made at the facility level in a facility directive.

Example: The receiving controller, when detecting the override alert (click, ziptone, etc.), shall answer the initiating controller, when ready, by stating sector I.D.

Regardless of the sequence chosen by a facility, the following items are required for all interphone contacts:

(a) Both controllers state position identification.

(b) Conduct coordination and response in accordance with this handbook and appendix.

(c) Both controllers terminate interphone contact with operating initials.

(11) The traffic action is established to clarify and standardize a condition that occurs in the system and has been referred to as many different things. This action is a exception to the routine and in many facilities may not be needed or used at all.

Following are examples where issuing traffic with appropriate restrictions is being used in the system:

(a) Traffic in response to a handoff or point out—

Controller A calls Controller B with handoff or point out. Controller B elects to respond by issuing traffic with appropriate restrictions and accepts the handoff or approves the point out.

Phraseology:

Controller B: TRAFFIC, (aircraft position), (aircraft identification), (altitude information), (appropriate restrictions; e.g., turn in reference to ....).

Controller A: TRAFFIC OBSERVED.

or

UNABLE (see Note 9(a)(b)), (operating initials).

Controller B: RADAR CONTACT

or

POINT OUT APPROVED, (operating initials).

The above process is to be inserted into the step-by-step for handoff or point out in the step where the receiving controller states restrictions.

(b) Initiating traffic in anticipation of a handoff or point out—

A slow aircraft overflying approach control airspace may require the departure controller to have departures level off underneath. However, in anticipation of the departure handoff, the center controller initiates a call to the approach control, transfers the radar identification by issuing traffic, and gives appropriate restrictions for the departures to continue climb in reference to the traffic.

Phraseology:

Initiating Controller: TRAFFIC, (aircraft position), (aircraft identification), (altitude information), (appropriate restrictions; e.g., climb reference....).

Receiving Controller: TRAFFIC OBSERVED

or

UNABLE (see Note 9(a)(b)), (operating initials).

Initiating Controller: (operating initials).

(c) In conjunction with a request for control release of an aircraft—

Controller A gives Controller B an early handoff on AA10 and transfers radio communications. Subsequently, Controller B requests control of AA10 while the aircraft is still in Controller A's airspace. Controller A relinquishes control of AA10 by issuing appropriate "traffic" restrictions.

Phraseology:

Controller A: TRAFFIC, (aircraft position), (aircraft identification), (aircraft altitude information), (appropriate restrictions; e.g., your control to descend reference....).

Controller B: TRAFFIC OBSERVED.

or

UNABLE (see Note (9)(b)), (operating initials).

Controller A: (operating initials).

Take action to label the target or to display the data block on the appropriate controller's display.

(d) In order to clarify the meaning of phraseology often used to issue restrictions in conjunction with "traffic," the following phrases are explained:

(i) "In reference to..." or "Your control" stated alone without stating the terms "climb," "descend," or "turn" means that no restrictions are intended; i.e., "anything you want to do with that aircraft is approved within my airspace." If any restrictions are intended, you must specifically state the restrictions.

(ii) "Climb in reference to..." or "Your control to climb" means that approval is granted for climb only; descents and turns are not approved.

(iii) "Descend in reference to ..." or "Your control to descend" means that approval is granted for descent only; climbs and turns are not approved.

(iv) "Turn in reference to ..." or "Your control to turn" means that approval is granted for turns (heading changes) only; climbs and descents are not approved.

(v) For brevity in all of the above, the phrase "in reference to" may be shortened to "reference" or "respect."

[illegible]

(8)(a) When the receiving controller [illegible] to a handoff or a point out by saying "unable," [illegible] When time permits, he should, if time permits, state the reason; e.g., "radar failure," or "frequency failure," or "traffic," etc.

(b) When the controller [illegible] traffic restrictions states "unable," it means he is unable to comply with the restrictions. Normally, alternate instructions should be issued at this time.

(10) The step-by-step process described in this appendix covers the sequence [illegible] when safety is [illegible] in various types of [illegible] it is permissible for the sequence to be changed when [illegible]

Example: The receiving controller, [illegible] (refer to [illegible] 11).

Regardless of the [illegible] by a facility, the following items are required for all [illegible] systems:

(a) Both controllers state position identification.

(b) [illegible] in accordance with this handbook and Appendix.

tions. Subsequently, Controller A [illegible] of AA 8 while the aircraft is [illegible] airport. Controller A [illegible] AAIE 14 [illegible]

Phraseology:

Controller A, TRACON: [illegible] and identification, [illegible] appropriate restrictions [illegible]

Controller B: [illegible]

UNABLE two zero zero [illegible]

Controller A: [illegible]

Take action to [illegible] in order to [illegible]

[illegible]

Controller A [illegible] AA 15 [illegible]

APPENDIX D

STANDARD OPERATING PRACTICE (SOP) FOR THE TRANSFER OF POSITION RESPONSIBILITY

1. PURPOSE

This appendix prescribes the method and step-by-step process for conducting a position relief briefing and transferring position responsibility from one specialist to another.

2. DISCUSSION

In all operational facilities, the increase in traffic density and the need for the expeditious movement of traffic without compromising safety have emphasized the importance of the position relief process. The contents, methods, and practices used for position relief and briefings vary among personnel, and pertinent information is often forgotten or incompletely covered. Major problems occur whenever there is a heavy reliance upon memory, unsupported by routines or systematic reminders. This SOP addresses the complete task of transferring position responsibility and the associated relief briefing.

Position relief unavoidably provides workload for specialists at the time of relief. The intent of this SOP is to make the transfer of position responsibility take place smoothly and to ensure a complete transfer of information with a minimum amount of workload. The method takes advantage of a self-briefing concept in which the relieving specialist obtains needed status information by reading from the Status Information Area/s to begin the relief process. Up to the moment information related to the control of aircraft or vehicular movements requires verbal exchanges between specialists during the relief process. The method also specifies the moment when the transfer of position responsibility occurs.

In the final part of the relief process, the specialist being relieved monitors and reviews the position to ensure that nothing has been overlooked or incorrectly displayed and that the transfer of position responsibility occurred with a complete briefing.

3. TERMS

The following terms are important for a complete understanding of this SOP:

a. Status Information Area (SIA). Manual or automatic displays of the current status of position related equipment and operational conditions or procedures.

b. Written Notes. Manually recorded items of information kept at designated locations on the position of operation. They may be an element of the Status Information Area/s.

c. Checklist. An ordered listing of items to be covered during a position relief.

4. PRECAUTIONS

a. Specialists involved in the position relief process should not rush or be influenced to rush.

b. During position operation, each item of status information which is or may be an operational factor for the relieving specialist should be recorded as soon as it is operationally feasible so that it will not be forgotten or incorrectly recorded.

c. Extra care should be taken when more than one specialist relieves or is being relieved from a position at the same time; e.g., combining or decombining positions. Such simultaneous reliefs should be approached with caution.

5. RESPONSIBILITIES

a. The specialist being relieved shall be responsible for ensuring that any pertinent status information of which he/she is aware is relayed to the relieving specialist and is either:

(1) Accurately displayed in the Status Information Area/s for which he/she has responsibility, or

(2) Relayed to the position having responsibility for accurately displaying the status information.

b. The relieving specialist shall be responsible for ensuring that, prior to accepting responsibility

for the position, any unresolved questions pertaining to the operation of the position are resolved.

c. The relieving specialist and the specialist being relieved shall share equal responsibility for the completeness and accuracy of the position relief briefing.

5c Note. — The "sharing" of this responsibility means that the specialist being relieved is obligated to provide a complete, accurate briefing and the relieving specialist is obligated to ensure that a briefing takes place and is to his/her total satisfaction.

d. The specialists engaged in a position relief shall conduct the relief process at the position being relieved unless other procedures have been established and authorized by the facility air traffic manager.

6. STEP-BY-STEP PROCESS

Relieving Specialist	*Specialist Being Relieved*
a. PREVIEW THE POSITION	
(1) Follow checklist and review the Status Information Area/s. (Note.— This sub-step may be replaced by an authorized pre-position briefing provided an equivalent review of checklist items is accomplished.)	
(2) Observe position equipment, operational situation, and the work environment.	
(3) Listen to voice communications and observe other operational actions.	
(4) Observe current and pending aircraft and vehicular traffic and correlate with flight and other movement information.	
(5) Indicate to the specialist being relieved that the position has been previewed and that the verbal briefing may begin. Note.— Sub-steps (2), (3), and (4) may be conducted concurrently or in any order.	
b. VERBAL BRIEFING	
	(1) Brief the relieving specialist on the abnormal status of items not listed on the Status Information Area/s as well as on any items of special interest calling for verbal explanation or additional discussion.
	(2) Brief on traffic, if applicable.
(3) Ask questions necessary to ensure a complete understanding of the operational situation.	
	(4) Completely answer any questions asked.
c. ASSUMPTION OF POSITION RESPONSIBILITY	
(1) Make a statement or otherwise indicate to the specialist being relieved that position responsibility has been assumed.	
	(2) Release the position to the relieving specialist.
d. REVIEW THE POSITION	
(1) Sign-on the position unless a facility directive authorizes sub-step (8).	
(2) Check, verify, and update the information obtained in steps (a) and (b).	
(3) Check position equipment in accordance with existing directives.	
	(4) Review checklist, Status Information Area/s, written notes, and other prescribed sources of information and advise the relieving specialist of known omissions, updates, or inaccuracies.
	(5) Observe overall position operation to determine if assistance is needed.
	(6) If assistance is needed, provide or summon it as appropriate.

Relieving Specialist

Specialist Being Relieved

(7) Advise the appropriate position regarding known Status Information Area/s omissions, updates, or inaccuracies.

(8) Sign-on the relieving specialist if appropriate.

(9) Sign off the position in accordance with existing directives or otherwise indicate that the relief process is complete.

[*References are to Paragraph numbers*]

A

ABBREVIATED DEPARTURE CLEARANCE [4-17] [4-22]
Abbreviated IFR Flight Plans [Glossary]
Abeam [Glossary]
Abort [Glossary]
ACCIDENT CAUSES [9-6]
Acknowledge [Glossary]
Acrobatic Flight [Glossary]
ACTIVE RUNWAY USE [3-3] [3-4]
Additional Services [Glossary]
ADHERENCE TO CLEARANCE [4-45]
Administrator [Glossary]
ADVANCE APPROACH INFORMATION [4-65] [4-72]
Advise Intentions [Glossary]
Advisory Frequency [Glossary]
Advisory [Glossary]
Advisory Service [Glossary]
ADVISORY SERVICES TO ARRIVING VFR FLIGHTS [4-90]
AERIAL REFUELING [5-25] [6-52] [8-29] [8-30] [8-31] [8-38]
Aerial Refueling/Inflight Refueling [Glossary]
AERIAL SAMPLING MISSIONS [2-4] [2-86] [8-36]
Aerodrome [Glossary]
Aeronautical Beacon [Glossary]
Aeronautical Chart [Glossary]
Affirmative [Glossary]
AFTERBURNER [4-21]
AIR AMBULANCE [2-4]
Air Carrier District Office/ACDO [Glossary]
AIR DEFENSE EMERGENCY [8-12] [9-61]
Air Defense Emergency [Glossary]
AIR DEFENSE EXERCISE [5-31]
Air Defense Identification Zone/ADIZ [Glossary]
Air Navigation Facility [Glossary]
Air Route Surveillance RADAR/ARSR [Glossary]
Air Route Traffic Control Center/ARTCC [Glossary]
AIR SAFETY [2-9] [2-73]
AIR TAXI [2-54] [2-86] [2-87] [3-145]
Air Taxi [Glossary]
Air Traffic Clearance/ATC Clearance [Glossary]
Air Traffic Control Command Center/ATCCC [Glossary]
Air Traffic Control Service [Glossary]
Air Traffic Control Specialist/Controller [Glossary]
Air Traffic Control/ATC [Glossary]
Air Traffic [Glossary]
AIRCRAFT APPROACH CATEGORIES [3-93] [4-85] [5-152]
Aircraft Approach Category [Glossary]
Aircraft Classes [Glossary]
AIRCRAFT COUNTS [8-10] [8-12]
AIRCRAFT EMERGENCY [9-4] [9-15]
Aircraft [Glossary]
AIRCRAFT IDENTIFICATION [2-35] [2-38] [2-52] [2-53] [2-56] [2-75] [2-76] [2-82] [2-86] [3-4] [4-10] [4-66] [4-71] [5-50] [5-60] [5-61] [5-62] [5-65] [5-113] [5-144] [5-213] [7-10] [7-73] [8-12] [8-36] [9-10] [9-22] [9-28]
AIRCRAFT SEIZURE [9-22]
Airman's Information Manual/AIM [Glossary]
AIRMET/Airman's Meteorological Information [Glossary]
Airport Advisory Area [Glossary]
Airport Advisory Service/AAS [Glossary]
Airport Elevation/Field Elevation [Glossary]
Airport [Glossary]
Airport Information Desk/AID [Glossary]
Airport Lighting [Glossary]
Airport Marking Aids [Glossary]
Airport Rotating Beacon [Glossary]
Airport Surface Detection Equipment/ASDE [Glossary]
Airport Surveillance RADAR/ASR [Glossary]
AIRPORT TRAFFIC AREA [2-16] [3-9] [3-11] [3-47] [7-31]
Airport Traffic Area [Glossary]
Airport Traffic Control Service [Glossary]
AIRPORT TRAFFIC CONTROL TOWER [2-85]
Airport/Facility Directory [Glossary]
Airspeed [Glossary]
Airstart [Glossary]
Airway Beacon [Glossary]
Airway/Federal Airway [Glossary]
ALERT AREA [8-40] [10-2] [10-33]
Alert Notice/ALNOT [Glossary]
Alpha Numeric Display/Data Block [Glossary]
ALTERNATE AIRPORT [8-29] [9-43]
Alternate Airport [Glossary]
ALTERNATIVE AIRWAY [2-90]
ALTERNATIVE CLEARANCE [1-20] [7-2] [7-20] [7-35]
ALTIMETER [2-84] [2-111] [3-100] [3-120] [4-10] [4-42] [4-43] [4-72] [5-37] [5-131] [7-3] [9-53] [10-4]
ALTIMETER SETTING [2-84] [2-111] [3-100] [3-120] [4-10] [4-42] [4-43] [4-72] [5-37] [5-131] [7-3] [9-53] [10-4]
Altimeter Setting [Glossary]
ALTITUDE ASSIGNMENT [4-10] [4-21] [4-40] [4-41] [4-42] [4-43] [4-44] [4-45] [4-46] [4-47] [4-80] [4-83] [4-90] [5-90] [5-123] [7-43] [7-94] [8-3] [8-29] [8-52] [10-5]
ALTITUDE CHANGE [2-35] [4-21] [4-46] [5-25] [6-30] [6-31] [8-3] [8-22] [8-29] [9-13]
ALTITUDE DEVIATION [8-33]
Altitude [Glossary]
Altitude Readout/Automatic Altitude Report [Glossary]
ALTITUDE RESERVATION [2-1] [2-35] [4-16] [4-22] [8-26] [8-31]
Altitude Reservation/ALTRV [Glossary]
ALTITUDE RESTRICTION [2-53] [3-131] [4-14] [4-21] [4-45] [5-91]
Altitude Restriction [Glossary]
Altitude Restrictions Are Cancelled [Glossary]
ALTITUDE VERIFICATION [4-47] [5-38] [6-50]
ALTRV [2-35] [2-37] [4-16] [4-22] [4-40] [5-25] [8-34] [8-37] [8-40]
AMBULANCE FLIGHTS [2-4] [2-86]
AMENDED CLEARANCE [4-14]
AMENDED FLIGHT PLAN [2-31] [9-18]

[References are to Paragraph numbers]

APPROACH CLEARANCE [2-52] [3-90] [3-91] [3-131] [4-17] [4-45] [4-51] [4-62] [4-63] [4-64] [4-67] [4-68] [4-70] [4-72] [4-80] [4-81] [4-82] [4-83] [4-84] [4-85] [4-86] [4-87] [4-88] [4-89] [4-90] [4-91] [5-100] [5-122] [5-123] [5-126] [5-134] [5-143] [6-61] [6-66] [7-30] [7-32] [7-33] [7-35] [9-40] [9-56] [10-16] [10-17]
Approach Clearance [Glossary]
Approach Control Facility [Glossary]
Approach Control Service [Glossary]
Approach Gate [Glossary]
Approach Sequence [Glossary]
Approach Speed [Glossary]
Apron/Ramp [Glossary]
Arc [Glossary]
AREA NAVIGATION [6-34]
Area Navigation/RNAV [Glossary]
Army Aviation Flight Information Bulletin/USAFIB [Glossary]
Arresting System [Glossary]
ARRIVAL MESSAGES [8-10]
Arrival Time [Glossary]
ARTS [3-9] [4-71] [5-21] [5-53] [5-62] [5-64] [5-65] [5-210] [5-211] [5-212] [5-213] [5-214] [5-216] [5-217] [7-32] [7-77]
ASPEN AIRCRAFT [9-61]
ATC Advises [Glossary]
ATC Assigned Airspace/ATCAA [Glossary]
ATC CLEARANCE [3-7] [3-80] [4-21] [4-22] [4-45] [4-60] [8-3] [8-21] [8-26] [9-27] [9-54] [10-3]
ATC Clears [Glossary]
ATC DELAY [8-38]
ATC Instruction [Glossary]
ATC Requests [Glossary]
ATC SERVICES [1-1] [1-4] [1-9] [2-1] [2-2] [2-50] [2-103] [3-9] [4-11] [4-65] [4-90] [5-3] [5-6] [5-13] [5-20] [5-123] [5-133] [5-180] [6-4] [7-60] [7-70] [7-80] [7-90] [7-96] [8-29] [8-30] [8-37] [9-3] [9-15] [9-24] [9-50]
ATIS [2-70] [3-34] [3-100] [3-120] [3-121] [4-52] [4-64] [4-65] [4-70] [4-72] [5-3] [5-125] [5-126] [5-131] [5-214] [7-3] [8-83] [10-4]
AUTOMATED RADAR TERMINAL SYSTEM [2-35] [5-210] [5-211] [5-212] [5-213] [5-214] [5-215] [5-216] [5-217]
Automated RADAR Terminal Systems/ARTS [Glossary]
AUTOMATIC ALTITUDE REPORTING [5-38] [5-39] [5-52]
Automatic Altitude Reporting [Glossary]
Automatic Carrier Landing System/ACLS [Glossary]
Automatic Direction Finder/ADF [Glossary]
AUTOMATIC TERMINAL INFORMATION SERVICE [3-34]
Automatic Terminal Information Service/ATIS [Glossary]
Autorotation [Glossary]
Aviation Weather Service [Glossary]

B

BALLOONS [8-70] [8-71]
BASE LEG [3-9] [5-135] [9-54]
BEACON TARGET DISPLACEMENT [5-78]
Bearing [Glossary]
Below Minimums [Glossary]
BIRDS [2-22]
Blast Fence [Glossary]
Blind Speed [Glossary]
Blind Spot/Blind Zone [Glossary]
BOMB [4-32] [9-27]
BOMB THREATS [9-27]
BRAKING ACTION [2-102] [3-33] [3-34] [3-100] [3-120] [3-123]
Braking Action (Good, Fair, Poor, Nil) [Glossary]
BRAKING ACTION ADVISORIES [2-102] [3-34] [3-100] [3-120]
Braking Action Advisories [Glossary]
BRAKING ACTION REPORTS [3-33] [3-34]
BROADCAST [2-101] [3-34] [3-100] [3-120] [4-64] [4-70] [4-72] [4-73] [5-5] [5-131] [7-3] [8-54] [8-71] [8-83] [9-22] [9-43] [10-4] [10-51]
Broadcast [Glossary]

C

CALL SIGNS [2-4] [2-76] [2-86] [5-138] [8-2] [8-26] [8-31] [9-61]
Call Up [Glossary]
CANADIAN AIRSPACE [2-42] [10-1] [10-2] [10-3] [10-4] [10-5] [10-6] [10-7] [10-8] [10-10] [10-11] [10-12] [10-13] [10-14] [10-15] [10-16] [10-17] [10-18] [10-30] [10-31] [10-32] [10-33] [10-34] [10-35] [10-36] [10-50] [10-51]
CANADIAN BORDER CROSSING [10-6]
Cardinal Altitudes or Flight Levels [Glossary]
Ceiling [Glossary]
Celestial Navigation [Glossary]
Center Weather Advisory [Glossary]
Center's Area [Glossary]
CHAFF [1-4] [2-103] [5-5]
Chaff [Glossary]
CHANGEOVER POINT [7-31] [7-77]
Charted Visual Flight Procedure (CVFP) Approach [Glossary]
CHARTED VISUAL FLIGHT PROCEDURES [7-34]
Chase/Chase Aircraft [Glossary]
Circle To Land Maneuver/Circling Maneuver [Glossary]
Circle To Runway (Runway Numbered) [Glossary]
CIRCLING APPROACH [4-80] [4-85] [5-152] [5-182] [7-49]
CIRCLING MINIMUMS [2-105] [3-121] [4-64] [4-67] [4-72] [5-131] [5-152] [6-60]
CLEAR AIR TURBULENCE [2-102]
Clear Air Turbulence/CAT [Glossary]
CLEARANCE DELAY [2-50] [2-58] [4-50] [4-51] [8-38]
CLEARANCE DELIVERY [2-72] [2-85] [4-12] [7-96]
Clearance [Glossary]
CLEARANCE ITEMS [4-10] [4-45]
Clearance Limit [Glossary]
CLEARANCE LIMITS [2-35] [2-53] [2-58] [3-71] [4-10] [4-21] [4-45] [4-50] [4-51] [4-53] [4-60] [4-66] [4-69] [4-72] [4-81] [8-35] [9-14] [10-6]
CLEARANCE PREFIX [4-11] [9-43]
CLEARANCE RELAY [4-13] [4-21] [9-27] [9-54]
CLEARANCE RESTRICTION [4-23] [9-14]
Clearance Void If Not Off By (Time) [Glossary]
CLEARANCE VOID TIME [4-23] [9-14]
CLEARED AS FILED [2-59] [4-22] [8-30]
Cleared As Filed [Glossary]
Cleared For (Type Of) Approach [Glossary]
Cleared For Approach [Glossary]
Cleared For Takeoff [Glossary]
CLEARED FOR THE OPTION APPROACH [3-90] [10-1]
Cleared For The Option [Glossary]
Cleared Through [Glossary]
Cleared To Land [Glossary]
Clearway [Glossary]
Climb To VFR [Glossary]

Climbout [Glossary]
Closed Runway [Glossary]
Closed Traffic [Glossary]
Clutter [Glossary]
Coastal Fix [Glossary]
Codes/Transponder Codes [Glossary]
Combined Center-RAPCON/CERAP [Glossary]
Common Route/Common Portion [Glossary]
COMMUNICATION CIRCUITS [9-18]
COMMUNICATIONS RELEASE [4-87] [5-123]
Compass Locator [Glossary]
Compass Rose [Glossary]
Composite Flight Plan [Glossary]
Composite Route System [Glossary]
Composite Separation [Glossary]
COMPULSORY REPORTING POINTS [4-5] [4-32] [5-12] [9-14]
Compulsory Reporting Points [Glossary]
CONFLICT ADVISORY [2-6]
CONFLICT ALERT [2-6] [5-190] [5-215]
Conflict Alert [Glossary]
CONSOLAN [Glossary]
CONTACT APPROACH [2-59] [4-63] [4-80] [5-13] [7-3] [7-35] [10-16]
Contact Approach [Glossary]
Contact [Glossary]
Conterminous U.S. [Glossary]
Continental United States [Glossary]
Control Sector [Glossary]
Control Slash [Glossary]
CONTROL SYMBOLOGY [2-59]
CONTROL TRANSFER [1-20] [2-8] [2-15] [2-17] [2-23] [2-38] [2-52] [4-26] [4-47] [4-52] [4-63] [4-66] [4-69] [4-71] [5-24] [5-25] [5-39] [5-60] [5-61] [5-62] [5-63] [5-64] [5-65] [5-66] [5-167] [7-32] [7-77] [8-21] [8-70] [9-19]
CONTROL ZONE [3-1] [4-21] [5-6] [5-90] [7-10] [7-40] [7-41] [7-45] [7-46] [7-47] [8-82] [10-15]
CONTROLLED AIRSPACE [2-50] [4-1] [4-21] [4-44] [5-90] [8-34] [8-83] [10-2] [10-12]
Controlled Airspace [Glossary]
CONTROLLED FIRING AREA [8-40]
Controller [Glossary]
CONTROLLER RESPONSIBILITY [1-1] [2-6] [2-15] [2-20] [3-3] [3-9] [3-30] [3-71] [3-123] [3-124] [4-22] [4-71] [4-90] [5-60] [5-62] [5-63] [5-65] [5-66] [5-100] [5-124] [5-125] [5-126] [5-140] [5-183] [5-211] [5-221] [5-225] [7-10] [8-70]
Convective SIGMET/Convective Significant Meteorological Information [Glossary]
Coordinates [Glossary]
Coordination Fix [Glossary]
Correction [Glossary]
COURSE DEVIATION [5-154]
Course [Glossary]
Critical Engine [Glossary]
Cross (Fix) At (Altitude) [Glossary]
Cross (Fix) At Or Above (Altitude) [Glossary]
Cross (Fix) At Or Below (Altitude) [Glossary]
CROSSING ALTITUDE [4-3] [4-21] [4-45] [10-6]
Crosswind Component [Glossary]
Crosswind [Glossary]
CROSSWIND LEG [8-26]
CRUISE CLEARANCE [4-45] [6-52]
Cruise [Glossary]
Cruising Altitude/Level [Glossary]
CUSTOMS NOTIFICATION [8-12]

D

DANGEROUS MATERIALS [8-20]
DECISION HEIGHT [2-84] [5-144] [5-161] [5-165] [5-166]
Decision Height/DH [Glossary]
Decoder [Glossary]
Defense Visual Flight Rules/DVFR [Glossary]
Delay Indefinite (Reason If Known) Expect Approach/Further Clearance (Time) [Glossary]
DENSITY ALTITUDE [3-100]
DEPARTMENT OF ENERGY [2-86] [8-22]
DEPARTURE CLEARANCE [4-17] [4-21] [4-22] [4-24] [10-6]
DEPARTURE CONTROL [3-102] [7-79] [7-96]
Departure Control [Glossary]
DEPARTURE DELAYS [3-101] [4-25]
DEPARTURE INFORMATION [2-111] [3-100] [7-79] [7-96]
DEPARTURE MESSAGES [4-28] [5-197] [8-10] [8-11]
DEPARTURE PROCEDURES [3-100] [3-101] [3-102] [3-103] [3-104] [3-105] [3-106] [3-107] [3-108] [3-109] [3-110] [4-10] [4-20] [4-21] [4-22] [4-23] [4-24] [4-25] [4-26] [4-27] [4-28] [7-40]
DEPARTURE TIME CHANGE [2-35]
Departure Time [Glossary]
DERELICT BALLOONS [8-71]
DESCENT CLEARANCE [4-45] [4-46] [4-61] [4-64] [4-70] [4-91] [5-25] [5-101]
Deviations [Glossary]
DF Approach Procedure [Glossary]
DF Fix [Glossary]
DF Guidance/DF Steer [Glossary]
Direct [Glossary]
DIRECT ROUTES [3-140] [4-31] [4-32] [4-80] [5-51] [5-64] [6-43]
DIRECTION FINDER / DF SERVICES [9-3] [9-15] [9-50] [9-51] [9-52] [9-53] [9-54] [9-55] [9-56]
Direction Finder/DF/UDF/VDF/UVDF [Glossary]
DISABLED AIRCRAFT [3-30] [4-50]
DISASTER AREA RELIEF OPERATIONS [8-25] [9-6]
Discrete Code/Discrete Beacon Code [Glossary]
Discrete Frequency [Glossary]
Displaced Threshold [Glossary]
DISTANCE MEASURING EQUIPMENT / DME [2-35] [2-57] [4-5] [4-30] [4-45] [4-53] [4-66] [5-51] [5-91] [5-169] [6-1] [6-10] [6-11] [6-31] [6-32] [6-33] [6-34] [6-41] [6-42] [10-10] [10-11] [10-13]
Distance Measuring Equipment/DME [Glossary]
Distress [Glossary]
DME Fix [Glossary]
DME Separation [Glossary]
DOD FLIP [Glossary]
DOWNWIND LEG [3-6] [4-85] [5-135]
Drag Chute [Glossary]
DUTCH AIRCRAFT [9-61]

E

ELECTRONIC COUNTER MEASURES / ECM / ECCM [5-5] [8-37]
EMERGENCY COMMUNICATIONS [9-1] [9-61]
EMERGENCY DF APPROACH [9-54] [9-56]
EMERGENCY FREQUENCY [5-5] [9-11]

[References are to Paragraph numbers]

Emergency [Glossary]
EMERGENCY INTERCEPT AND ESCORT [9-15]
EMERGENCY LOCATOR TRANSMITTER / ELT [1-4] [9-4] [9-15] [9-26]
Emergency Locator Transmitter/ELT [Glossary]
EMERGENCY RADIO TRANSMISSIONS [2-77] [2-86] [9-54]
En Route Air Traffic Control Services [Glossary]
En Route Automated RADAR Tracking System/EARTS [Glossary]
En Route Descent [Glossary]
En Route Flight Advisory Service/Flight Watch [Glossary]
En Route Minimum Safe Altitude Warning/E-MSAW [Glossary]
EQUIPMENT MALFUNCTIONS [2-7] [2-10] [5-37]
Execute Missed Approach [Glossary]
Expect (Altitudes) At (Time) Or (Fix) [Glossary]
Expect Departure Clearance (Time)/EDCT [Glossary]
Expect Further Clearance (Time)/EFC [Glossary]
Expect Further Clearance Via (Airways, Routes, Or Fixes) [Glossary]
Expedite [Glossary]
EXPERIMENTAL AIRCRAFT [8-23]

F

FAA ADMINISTRATOR [1-6] [1-9] [2-74]
FAR EXEMPTION 2861A OPERATIONS [2-111]
Fast File [Glossary]
Feathered Propeller [Glossary]
Feeder Route [Glossary]
Ferry Flight [Glossary]
Filed [Glossary]
FINAL APPROACH [2-6] [2-59] [3-47] [3-105] [3-133] [4-64] [4-80] [4-89] [5-3] [5-6] [5-7] [5-91] [5-100] [5-114] [5-115] [5-120] [5-121] [5-122] [5-123] [5-124] [5-125] [5-126] [5-131] [5-132] [5-133] [5-134] [5-137] [5-139] [5-140] [5-141] [5-143] [5-144] [5-150] [5-152] [5-154] [5-164] [5-166] [5-180] [5-181] [5-182] [5-183] [5-217] [6-20] [6-60] [6-61] [6-63] [9-54] [10-13]
Final Approach - IFR [Glossary]
Final Approach Course [Glossary]
Final Approach Fix/FAF [Glossary]
Final Approach Point [Glossary]
Final Controller [Glossary]
Final [Glossary]
Fix [Glossary]
Fixed-Wing Special IFR/FW/SIFR [Glossary]
Flag/Flag Alarm [Glossary]
Flameout [Glossary]
FLIGHT CHECK [2-4] [2-54] [4-1] [8-3]
FLIGHT CHECK AIRCRAFT [8-3]
Flight Check [Glossary]
FLIGHT DIRECTION [4-40] [7-94]
FLIGHT IDENTIFICATION [5-57]
Flight Information Region/FIR [Glossary]
Flight Inspection/Flight Check [Glossary]
Flight Level [Glossary]
Flight Line [Glossary]
FLIGHT MOVEMENT MESSAGES [2-77]
FLIGHT NOTIFICATION MESSAGES [2-30]
Flight Path [Glossary]
FLIGHT PLAN [2-4] [2-30] [2-31] [2-32] [2-33] [2-34] [2-35] [2-36] [2-37] [2-38] [2-39] [2-40] [2-41] [2-42] [2-43] [2-52] [2-56] [2-74] [2-77] [3-121] [4-16] [4-22] [4-27] [4-32] [4-34] [4-62] [4-80] [4-90] [5-13] [5-25] [5-29] [5-30] [5-31] [5-39] [5-192] [5-197] [5-216] [5-226] [7-2] [7-20] [7-35] [8-2] [8-3] [8-10] [8-11] [8-12] [8-20] [8-21] [8-22] [8-25] [8-26] [8-29] [8-30] [8-31] [8-33] [8-35] [9-3] [9-16] [9-17] [9-18] [9-24] [9-50] [10-6] [10-8]
FLIGHT PLAN CANCELLATION [2-4] [2-38] [2-52] [3-121] [4-62] [4-80] [4-90] [5-13] [5-29] [5-216] [5-226]
FLIGHT PLAN CHANGE [2-34]
Flight Plan [Glossary]
FLIGHT PLAN VOID TIME [8-29]
FLIGHT PROGRESS STRIPS [2-30] [2-40] [2-50] [2-51] [2-52] [2-53] [3-4] [5-11] [5-64] [8-70]
Flight Recorder [Glossary]
FLIGHT SAFETY [2-9] [2-35] [2-102] [2-103] [5-125] [5-126] [5-191] [8-11] [9-27]
Flight Service Station/FSS [Glossary]
Flight Standards District Office/FSDO [Glossary]
Flight Test [Glossary]
Flight Watch [Glossary]
FLOW CONTROL [4-52] [8-10]
Flow Control [Glossary]
Fly Heading (Degrees) [Glossary]
FLYNET AIRCRAFT [2-4] [8-25]
FOREIGN MILITARY AIRCRAFT [2-86]
FOREIGN REGISTRY AIRCRAFT [2-86] [8-10]
Formation Flight [Glossary]
FORMATION FLIGHTS [2-13] [5-74] [8-29] [8-34]
FORWARDING AIRPORT CONDITIONS [3-121]
FORWARDING ARRIVAL INFORMATION [3-121] [8-10]
FORWARDING DEPARTURE INFORMATION [2-31] [2-32] [2-42] [8-10]
FORWARDING FLIGHT INFORMATION [2-31] [2-32] [2-40] [2-42] [2-57] [3-121] [8-10] [8-70]
FORWARDING FLIGHT PLANS [2-42]
FORWARDING WEATHER INFORMATION [3-121]
FREQUENCY CHANGES [2-17] [4-10] [4-62] [4-63] [4-87] [5-123] [9-11] [9-25]
Fuel Advisory Departure/FAD [Glossary]
FUEL DUMPING [8-50] [8-54] [10-50] [10-51]
Fuel Dumping [Glossary]
Fuel Siphoning/Fuel Venting [Glossary]
FULL ROUTE CLEARANCE [4-22]

G

GARDEN PLOT AIRCRAFT [2-4]
GATE HOLD PROCEDURES [3-101]
Gate Hold Procedures [Glossary]
General Aviation District Office/GADO [Glossary]
General Aviation [Glossary]
GIANT LANCE OPERATIONS [8-34]
Glide Path, (On/Above/Below) [Glossary]
Glide Slope Intercept Altitude [Glossary]
Glide Slope/GS [Glossary]
Go Ahead [Glossary]
Go Around [Glossary]
GO-AROUND [3-90] [7-30] [7-31]
Ground Clutter [Glossary]
GROUND CONTROL [2-17] [2-70] [3-3] [3-4] [7-79]
Ground Controlled Approach/GCA [Glossary]

[References are to Paragraph numbers]

GROUND EMERGENCIES [9-6]
GROUND MISSILE EMERGENCY [9-70] [9-72] [9-73]
GROUND MOVEMENTS [3-80] [3-81] [3-83] [3-140]
Ground Speed [Glossary]
GROUND VEHICLE OPERATIONS [3-84]

H

Handoff [Glossary]
Have Numbers [Glossary]
Height Above Airport/HAA [Glossary]
Height Above Landing/HAL [Glossary]
Height Above Touchdown/HAT [Glossary]
HELICOPTER SEPARATION STANDARDS [3-142] [3-143] [7-48] [7-49] [7-92]
HELICOPTER SPECIAL VFR [7-46] [7-48] [7-49]
HELICOPTER TAXIING [3-82] [3-140] [3-142]
HELICOPTER VFR OPERATIONS [7-46] [7-47] [7-49] [7-92] [10-15]
Helicopter/Copter [Glossary]
Helipad [Glossary]
Heliport [Glossary]
Hertz/Hz [Glossary]
HIGH ALTITUDE INSTRUMENT APPROACH [4-5] [4-83] [5-100]
High Frequency Communications/HF Communications [Glossary]
High Frequency/HF [Glossary]
HIGH PERFORMANCE CLIMB [4-21]
High Speed Taxiway/Exit/Turnoff [Glossary]
HIJACK [5-33] [9-22]
HIJACK PROCEDURES [5-33] [9-22]
Hold/Holding Procedure [Glossary]
HOLDING ALTITUDE [5-25] [6-66]
HOLDING FIX [2-51] [2-52] [4-50] [4-53] [4-54] [4-71] [4-80] [4-89] [7-4] [7-49]
Holding Fix [Glossary]
HOLDING INSTRUCTIONS [2-58] [3-7] [3-81] [3-103] [4-10] [4-50] [4-51] [4-53] [4-60] [4-80]
HOLDING MINIMUMS [4-5] [4-50] [4-80] [5-100] [6-66] [7-49]
HOLDING SPEED [2-52] [4-50] [5-100] [10-11]
Homing [Glossary]
Hover Check [Glossary]
Hover Taxi [Glossary]
How Do You Hear Me ? [Glossary]

I

I Say Again [Glossary]
Ident Feature [Glossary]
Ident [Glossary]
If Feasible, Reduce Speed To (Speed) [Glossary]
If No Transmission Received For (Time) [Glossary]
IFR Aircraft/IFR Flight [Glossary]
IFR ALTITUDES [4-45] [4-80] [4-90] [5-51] [5-90] [5-191] [6-52] [8-26] [8-29] [9-31]
IFR Conditions [Glossary]
IFR FLIGHT LEVELS [4-14] [4-21] [4-22] [4-40] [4-41] [4-42] [4-43] [4-45] [4-47] [4-60] [4-64] [5-25] [6-63] [8-29] [10-2] [10-6] [10-18] [10-31]
IFR FLIGHT PLAN [2-4] [2-38] [2-41] [3-121] [4-27] [4-62] [4-80] [5-13] [5-29] [5-39] [5-216] [5-226] [7-2] [7-20] [8-22] [9-3] [9-24] [9-50]
IFR Military Training Routes (IR) [Glossary]
IFR OPERATIONS IN CONTROLLED AIRSPACE [2-50] [4-21] [4-44] [5-39] [5-90] [10-2] [10-12]
IFR OPERATIONS IN UNCONTROLLED AIRSPACE [4-34] [5-90]
IFR SEPARATION STANDARDS [3-100] [4-80] [4-90] [8-26] [8-36] [10-16]
IFR Takeoff Minimums And Departure Procedures [Glossary]
ILS APPROACH [2-59] [3-84] [4-64] [4-80] [5-13] [5-125] [5-126] [5-180]
ILS Categories [Glossary]
ILS CRITICAL AREA [3-84]
Immediately [Glossary]
IN-FLIGHT DEVIATION [5-39]
IN-FLIGHT EMERGENCY [5-39] [8-38] [9-10] [9-61]
Information Request/INREQ [Glossary]
Initial Approach Fix/IAF [Glossary]
Initial Approach Segment [Glossary]
INITIAL CONTACT [2-86] [2-111] [4-47] [4-62] [5-37] [5-138] [7-3] [7-71] [7-72] [7-79] [8-30] [9-11]
Inner Marker/IM/Inner Marker Beacon [Glossary]
Instrument Approach Procedure/IAP/Instrument Approach [Glossary]
Instrument Flight Rules/IFR [Glossary]
INSTRUMENT LANDING SYSTEM / ILS [2-7] [2-59] [2-120] [3-31] [3-84] [4-1] [4-57] [4-64] [4-72] [4-73] [4-80] [5-13] [5-113] [5-125] [5-126] [5-144] [5-180] [6-61]
Instrument Landing System/ILS [Glossary]
Instrument Meteorological Conditions/IMC [Glossary]
Instrument Runway [Glossary]
INTERCHANGE AIRCRAFT [2-54] [2-87]
INTERIM ALTITUDES [4-21] [5-57] [5-192] [8-38]
Intermediate Approach Segment [Glossary]
Intermediate Fix/IF [Glossary]
International Airport [Glossary]
International Civil Aviation Organization/ICAO [Glossary]
International Flight Information Manual/IFIM [Glossary]
INTERPHONE COMMUNICATIONS [2-39] [2-53] [2-59] [2-70] [2-71] [2-72] [2-73] [2-74] [2-75] [2-76] [2-77] [2-78] [2-79] [2-80] [2-81] [2-82] [2-83] [2-84] [2-85] [2-86] [2-87] [5-125] [8-10]
Interrogator [Glossary]
Intersecting Runways [Glossary]
Intersection Departure/Intersection Takeoff [Glossary]
Intersection [Glossary]
INTERSECTION TAKEOFF (DEPARTURE) [3-4] [3-107] [5-113]

J

Jamming [Glossary]
Jet Blast [Glossary]
Jet Route [Glossary]
JET ROUTES [2-90] [4-30] [4-31] [4-32] [4-44]
Jet Stream [Glossary]
Jettisoning Of External Stores [Glossary]

K—L

Known Traffic [Glossary]
Landing Area [Glossary]
LANDING CLEARANCE [1-4] [3-31] [3-123] [3-126] [3-127] [3-128] [3-129] [3-145]
Landing Direction Indicator [Glossary]
Landing Minimums/IFR Landing Minimums [Glossary]
Landing Roll [Glossary]
LANDING SEQUENCE [3-90] [3-127] [4-68] [7-70] [7-72] [7-75] [7-77] [7-80]
Landing Sequence [Glossary]
Last Assigned Altitude [Glossary]
Lateral Separation [Glossary]
LAW ENFORCEMENT [8-28]
LETTERS OF AGREEMENT [1-8] [2-1] [2-11] [2-12] [2-16] [2-17] [2-38] [3-2] [3-20] [3-34] [3-61] [3-132] [3-133] [3-134] [4-22] [4-28] [4-41] [4-62] [4-66] [4-71] [5-20] [5-24] [5-25] [5-60] [5-64] [5-65] [5-66] [7-30] [7-32] [7-48] [7-49] [7-75] [7-96] [8-23] [8-26] [8-35] [8-41] [10-12]
Light Gun [Glossary]
Lighted Airport [Glossary]
LOCAL CONTROL [2-17] [2-70] [2-101] [3-3] [3-4] [3-9] [5-123] [5-126] [7-77]
Local Traffic [Glossary]
Localizer [Glossary]
Localizer Type Directional Aid/LDA [Glossary]
Localizer Usable Distance [Glossary]
Longitudinal Separation [Glossary]
LORAN/Long Range Navigation [Glossary]
Lost Communications/Two-Way Radio Communications Failure [Glossary]
LOW ALTITITUDE ALERT [2-6] [5-216] [5-226]
Low Altitude Airway Structure/Federal Airways [Glossary]
LOW APPROACH [3-5] [3-83] [3-90] [3-91] [3-103] [3-125] [3-131] [4-91] [5-72] [5-142] [5-143]
Low Approach [Glossary]
Low Frequency/LF [Glossary]
LOW LEVEL WIND SHEAR ALERT SYSTEM / LLWSAS [3-8]

M

MACH NUMBER [2-84] [5-100] [5-101] [5-102]
Mach Number [Glossary]
MAGNETIC COURSE [7-21]
MAGNETIC HEADING [1-20] [5-91] [9-53]
Maintain [Glossary]
Make Short Approach [Glossary]
MANDATORY ALTITUDE [4-84]
Mandatory Altitude [Glossary]
Marker Beacon [Glossary]
MARSA [2-11] [8-26] [8-29] [8-35]
MAXIMUM ALTITUDE [4-44] [4-83] [4-84] [9-26]
Maximum Authorized Altitude/MAA [Glossary]
Mayday [Glossary]
Metering Fix [Glossary]
Metering [Glossary]
Microwave Landing System/MLS [Glossary]
Middle Compass Locator [Glossary]
Middle Marker/MM [Glossary]
MILITARY AIRCRAFT [1-8] [1-9] [2-4] [2-11] [2-21] [2-74] [2-86] [3-35] [3-107] [3-133] [3-134] [4-32] [4-41] [4-60] [4-63] [4-90] [5-25] [5-40] [5-190] [8-20] [8-25] [9-18] [9-27] [10-14]
Military Authority Assumes Responsibility For Separation Of Aircraft/MARSA [Glossary]
MILITARY OPERATIONS AREA / MOA [2-111] [6-42] [8-40] [8-41] [8-42] [8-43]
MILITARY TRAINING ROUTES [8-26]
Military Training Routes/MTR [Glossary]
MINIMUM ALTITUDE [4-43] [4-44] [5-112] [9-31] [10-1]
Minimum Crossing Altitude/MCA [Glossary]
MINIMUM DESCENT ALTITUDE / MDA [2-6] [2-84] [4-85] [5-150] [5-152] [5-153] [6-60] [9-54]
Minimum Descent Altitude/MDA [Glossary]
Minimum En Route IFR Altitude/MEA [Glossary]
MINIMUM FUEL [2-8]
MINIMUM FUEL ADVISORY [2-8]
Minimum Fuel [Glossary]
Minimum Holding Altitude/MHA [Glossary]
Minimum IFR Altitudes/MIA [Glossary]
Minimum Obstruction Clearance Altitude/MOCA [Glossary]
Minimum Reception Altitude/MRA [Glossary]
MINIMUM SAFE ALTITUDE / MSA [4-90] [5-191] [5-216] [7-35] [7-94] [9-24] [9-50]
MINIMUM SAFE ALTITUDE WARNING / MSAW [5-191] [5-216]
Minimum Safe Altitude Warning/MSAW [Glossary]
Minimum Safe Altitude/MSA [Glossary]
MINIMUM VECTORING ALTITUDE / MVA [4-63] [4-90] [5-90] [5-120] [5-123] [7-94] [9-31]
Minimum Vectoring Altitude/MVA [Glossary]
Minimums/Minima [Glossary]
MISSED APPROACH [2-59] [3-84] [3-90] [3-121] [3-133] [4-63] [4-71] [4-80] [4-88] [4-89] [4-90] [5-90] [5-112] [5-113] [5-115] [5-125] [5-131] [5-141] [5-144] [5-154] [5-155] [5-168] [5-182] [6-60] [6-61] [6-66] [7-30] [7-31] [7-49] [9-54]
Missed Approach [Glossary]
Missed Approach Point/MAP [Glossary]
Mode [Glossary]
MOORED BALLOONS [8-71]
Movement Area [Glossary]
MOVEMENT AREAS [2-20] [3-4] [3-20] [3-32] [3-70] [3-71] [3-80] [3-81] [3-141] [3-145]
Moving Target Indicator/MTI [Glossary]

N

NAS Stage A [Glossary]
NATIONAL AIRSPACE SYSTEM / NAS [2-9] [2-43] [5-53] [5-57] [5-194]
National Airspace System/NAS [Glossary]
National Beacon Code Allocation Plan Airspace/NBCAP Airspace [Glossary]
National Flight Data Center/NFDC [Glossary]
National Flight Data Digest/NFDD [Glossary]
National Search And Rescue Plan [Glossary]
NATIONAL TERMINAL RADAR PROGRAM [5-90] [7-60]
NATIONAL WEATHER SERVICE / NWS [2-103]
NAVAID ALTITUDE AND DISTANCE LIMITATIONS [4-1] [4-2] [4-5]
NAVAID Classes [Glossary]
NAVAID MALFUNCTION [2-10]

NAVAID MONITORING [5-64] [5-180]
NAVAID SERVICE VOLUME [4-4] [5-91]
NAVAID STATUS [4-33] [9-29]
Navigable Airspace [Glossary]
Navigational Aid/NAVAID [Glossary]
NAVY FLEET SUPPORT MISSIONS [1-4] [9-60]
NEACP AIRCRAFT [2-4]
Negative Contact [Glossary]
Negative [Glossary]
Night [Glossary]
No Gyro Approach/Vector [Glossary]
NOISE ABATEMENT [5-90] [7-2]
NOISE COMPLAINTS [3-11]
NOISE SENSITIVE AREA [3-60]
Noncomposite Separation [Glossary]
Nondirectional Beacon/Radio Beacon/NDB [Glossary]
NONMOVEMENT AREAS [3-141] [3-145]
NONPRECISION APPROACH [5-120] [5-180] [5-182]
Nonprecision Approach Procedure/Nonprecision Approach [Glossary]
NonRADAR Approach Control [Glossary]
NonRADAR [Glossary]
North American Route [Glossary]
Notice To Airmen/NOTAM [Glossary]
NOTICES TO AIRMEN / NOTAM [2-9] [3-30] [3-31] [3-35] [3-47] [5-6] [9-70] [9-74]
Notices To Airmen Publication [Glossary]
NUCLEAR CONTAMINATION ATMOSPHERIC SAMPLING [2-4] [8-36]
NUCLEAR RADIATION AREA [8-32]
NUMBERS USAGE [2-84]
Numerous Targets Vicinity (Location) [Glossary]
Obstacle [Glossary]
OBSTRUCTION ADVISORY [2-6]
OBSTRUCTION CLEARANCE [4-45] [4-80] [5-123] [9-31]
Obstruction [Glossary]
Obstruction Light [Glossary]
Off-route Vector [Glossary]
Offset Parallel Runways [Glossary]
On Course [Glossary]
On-Course Indication [Glossary]
Option Approach [Glossary]
Organized Track System [Glossary]
Out [Glossary]
Outer Fix [Glossary]
Outer Marker/OM [Glossary]
Over [Glossary]
OVERDUE AIRCRAFT [3-121] [4-71] [9-3] [9-5] [9-14] [9-16] [9-17]
Overhead Approach/360 Overhead [Glossary]

P

PAN [Glossary]
PARACHUTE JUMP OPERATIONS [8-80] [8-81] [8-82] [8-83] [10-7]
PARALLEL ILS APPROACH [5-125]
Parallel ILS Approaches [Glossary]
Parallel Offset Route [Glossary]
Parallel Runways [Glossary]
Permanent Echo [Glossary]
PHONETIC ALPHABET [2-54] [2-83] [2-86]
Photo Reconnaissance/PR [Glossary]
PILOT BRIEFING [4-70] [4-72] [5-131] [7-3]
Pilot Briefing/Pre-Flight Pilot Briefing [Glossary]
PILOT CLEARANCE RESPONSIBILITY [3-71] [4-80]
PILOT DEVIATIONS [2-103] [4-55]
PILOT REQUESTS [2-21] [3-35] [3-61] [3-100] [3-101] [3-107] [3-132] [4-5] [4-22] [4-50] [4-52] [4-53] [5-8] [5-90] [5-144] [5-150] [5-161] [7-20] [8-22] [8-23] [8-29] [9-2] [9-3] [9-27] [9-53] [9-60] [9-61]
PILOT RESPONSIBILITIES [2-20] [3-122] [3-123] [4-80] [5-166]
PILOT TRAFFIC ADVISORY PRACTICES [4-90]
PILOT WEATHER REPORT BROADCAST [3-34]
Pilot Weather Report/PIREP [Glossary]
Pilot-In-Command [Glossary]
PILOT/CONTROLLER GLOSSARY [1-4] [9-1]
Pilot's Discretion [Glossary]
Pilots Automatic Telephone Weather Answering Service/PATWAS [Glossary]
PIREP [2-102] [3-34] [5-120]
Position Report/Progress Report [Glossary]
POSITION REPORTING [2-35] [5-12] [8-3]
Position Symbol [Glossary]
POSITIVE CONTROL AREA [5-3] [5-36] [7-1]
Positive Control [Glossary]
PRACTICE INSTRUMENT APPROACH [7-2]
Practice Instrument Approach [Glossary]
PRACTICE PRECAUTIONARY APPROACH [3-134]
PRECIPITATION [3-30] [5-114]
Precipitation [Glossary]
Precision Approach Procedure/Precision Approach [Glossary]
Precision Approach RADAR/PAR [Glossary]
PRECISION DISTANCE MEASURING EQUIPMENT/DME [5-169]
PREFERENTIAL ROUTES [4-21] [4-60]
Preferential Routes [Glossary]
Preferred IFR Routes [Glossary]
PRESIDENTIAL AIRCRAFT [2-4] [2-86] [5-8]
PRIORITIES [2-2] [2-4] [2-6] [2-8] [2-77] [2-78] [2-86] [4-90] [5-90] [5-101] [7-41] [8-3] [8-35] [8-36]
PROCEDURAL LETTERS [1-8] [2-1]
PROCEDURE TURN [2-59] [4-80] [4-89] [6-20] [9-54] [10-13]
Procedure Turn Inbound [Glossary]
Procedure Turn/PT [Glossary]
Profile Descent [Glossary]
Programmable Indicator Data Processor/PIDP [Glossary]
PROHIBITED AREA [6-42] [8-41]
Proposed Boundary Crossing Time/PBCT [Glossary]
Published Route [Glossary]

Q

Quadrant [Glossary]
QUICK LOOK FUNCTIONS [4-71] [5-62]
Quick Look [Glossary]
Quota Flow Control [Glossary]

[References are to Paragraph numbers]

R

RADAR [1-4] [2-2] [2-3] [2-6] [2-16] [2-19] [2-20] [2-21] [2-35] [2-38] [2-53] [2-57] [2-75] [2-84] [2-85] [2-103] [2-106] [3-1] [3-4] [3-6] [3-9] [3-71] [3-102] [3-106] [3-123] [3-128] [4-2] [4-26] [4-28] [4-30] [4-31] [4-32] [4-44] [4-63] [4-64] [4-66] [4-80] [4-88] [5-1] [5-2] [5-3] [5-4] [5-5] [5-6] [5-7] [5-8] [5-9] [5-10] [5-11] [5-12] [5-13] [5-20] [5-21] [5-22] [5-23] [5-24] [5-25] [5-26] [5-27] [5-28] [5-29] [5-30] [5-31] [5-32] [5-33] [5-34] [5-35] [5-36] [5-37] [5-38] [5-39] [5-40] [5-50] [5-51] [5-52] [5-53] [5-54] [5-55] [5-56] [5-57] [5-60] [5-61] [5-62] [5-63] [5-64] [5-65] [5-66] [5-70] [5-71] [5-72] [5-73] [5-74] [5-75] [5-76] [5-77] [5-78] [5-79] [5-90] [5-91] [5-100] [5-101] [5-102] [5-104] [5-110] [5-111] [5-112] [5-113] [5-114] [5-115] [5-120] [5-121] [5-122] [5-123] [5-124] [5-125] [5-126] [5-130] [5-131] [5-132] [5-133] [5-134] [5-135] [5-136] [5-137] [5-138] [5-139] [5-140] [5-141] [5-142] [5-143] [5-144] [5-150] [5-151] [5-152] [5-153] [5-154] [5-155] [5-160] [5-161] [5-162] [5-163] [5-164] [5-165] [5-166] [5-167] [5-168] [5-169] [5-180] [5-181] [5-182] [5-183] [5-190] [5-191] [5-192] [5-193] [5-194] [5-195] [5-196] [5-197] [5-210] [5-211] [5-212] [5-213] [5-214] [5-215] [5-216] [5-217] [5-220] [5-221] [5-222] [5-223] [5-224] [5-225] [5-226] [6-43] [6-60] [6-61] [6-64] [6-66] [7-10] [7-31] [7-32] [7-33] [7-34] [7-42] [7-48] [7-60] [7-70] [7-71] [7-76] [7-77] [7-79] [7-80] [7-90] [7-92] [7-96] [7-97] [8-1] [8-2] [8-3] [8-21] [8-26] [8-30] [8-34] [8-37] [8-53] [8-60] [8-70] [8-71] [9-3] [9-12] [9-13] [9-14] [9-15] [9-22] [9-24] [9-25] [9-30] [9-40] [9-43] [9-50] [9-55] [9-71] [10-12] [10-30] [10-31] [10-32] [10-33] [10-34] [10-35] [10-36]
RADAR Advisory [Glossary]
RADAR ADVISORY SERVICE [2-16] [5-29]
RADAR APPLICATION [4-26] [5-50] [5-60] [5-70] [5-90] [5-100] [5-130] [5-196] [5-210] [5-220] [7-33] [7-60]
RADAR Approach Control Facility [Glossary]
RADAR Approach [Glossary]
RADAR Arrival [Glossary]
RADAR ARRIVAL PROCEDURES [4-63]
RADAR BEACON [2-53] [2-84] [3-9] [3-102] [4-63] [5-4] [5-20] [5-21] [5-22] [5-23] [5-24] [5-25] [5-26] [5-27] [5-28] [5-29] [5-30] [5-31] [5-32] [5-33] [5-34] [5-35] [5-36] [5-37] [5-38] [5-39] [5-40] [5-51] [5-52] [5-53] [5-55] [5-78] [5-221] [8-3] [8-30] [9-15] [9-43]
RADAR Contact [Glossary]
RADAR Contact Lost [Glossary]
RADAR DEPARTURE [4-28] [5-114]
RADAR Environment [Glossary]
RADAR EQUIPMENT PERFORMANCE [5-1]
RADAR FIX [2-53] [5-2] [5-9] [5-11] [5-51] [5-62] [5-169]
RADAR Flight Following [Glossary]
RADAR HANDOFF [2-38] [4-26] [4-28] [4-66] [5-60] [5-64] [5-65] [5-169]
RADAR IDENTIFICATION [3-9] [5-50] [5-51] [5-52] [5-53] [5-54] [5-55] [5-56] [5-57] [5-60] [5-61] [5-62] [5-63] [5-64] [5-65] [5-66] [5-113] [5-133] [8-30] [9-24]
RADAR Identification [Glossary]
RADAR Identified Aircraft [Glossary]
RADAR MAPPING [5-6]
RADAR Point Out/Point Out [Glossary]
RADAR Route [Glossary]
RADAR SEPARATION STANDARDS [10-34]
RADAR Service [Glossary]
RADAR SERVICE LIMITATIONS [5-6]
RADAR Service Terminated [Glossary]
RADAR Surveillance [Glossary]
RADAR SYSTEM PERFORMANCE [5-70]
RADAR TRACKING [5-194] [5-197]
RADAR TRAFFIC ADVISORY [2-16] [3-6] [3-9] [5-3] [7-60] [7-79] [7-96] [7-97]
RADAR VECTORS [1-4] [2-20] [2-21] [3-9] [4-64] [4-88] [6-60] [7-42] [7-70]
RADAR WEATHER ECHO INTENSITY LEVELS [2-103]
RADAR Weather Echo Intensity Levels [Glossary]
RADAR/Radio Detection And Ranging [Glossary]
Radial [Glossary]
Radio Altimeter/RADAR Altimeter [Glossary]
RADIO FAILURE PROCEDURES [9-54]
Radio [Glossary]
Radio Magnetic Indicator/RMI [Glossary]
RADIO MESSAGE FORMAT [2-75]
RAPCON [8-35]
READBACK [2-72]
Read Back [Glossary]
Receiving Controller/Facility [Glossary]
Release Time [Glossary]
Remote Communications Air/Ground Facility/RCAG [Glossary]
Remote Communications Outlet/RCO [Glossary]
Remote Transmitter/Receiver/RTR [Glossary]
Report [Glossary]
Reporting Point [Glossary]
REPORTING POINTS [3-120] [4-5] [4-32] [5-12] [5-51]
Request Full Route Clearance/FRC [Glossary]
RESCUE COORDINATION CENTER [9-26]
Rescue Coordination Center/RCC [Glossary]
RESEARCH AND DEVELOPMENT FLIGHTS [8-24]
RESTRICTED AIRSPACE [10-33]
RESTRICTED AREA [5-33] [6-42] [7-46]
Resume Own Navigation [Glossary]
RIGHT OF WAY [2-4]
RNAV Approach [Glossary]
Road Reconnaisance/RC [Glossary]
ROGER [Glossary]
ROTATING BEACON [3-56]
ROUTE COURSE CHANGES [6-43]
Route [Glossary]
Route Segment [Glossary]
ROUTE STRUCTURE CHANGES [4-31]
RUNWAY CENTERLINE LIGHTS [3-48]
RUNWAY CONDITION READING [3-33]
Runway Condition Reading/RCR [Glossary]
RUNWAY CONDITIONS [3-30] [3-31] [3-33] [3-34] [3-84] [5-125] [7-31]
RUNWAY CROSSING [3-6] [3-108] [3-123] [6-5]
RUNWAY EDGE LIGHTS [3-47] [3-52]
RUNWAY END IDENTIFIER LIGHTS [3-41]
Runway [Glossary]
Runway Gradient [Glossary]
RUNWAY HOLDING PROCEDURES [3-83]
RUNWAY LIGHTS [3-41] [3-43] [3-44] [3-47] [3-48] [3-51] [3-52] [3-53] [3-92] [5-126] [5-151] [5-155] [5-168] [9-41]
Runway Markings [Glossary]
Runway Profile Descent [Glossary]
RUNWAY USE [2-120] [2-122] [3-3] [3-34] [3-42] [3-52] [3-60] [3-100] [3-120] [3-121] [3-126] [4-72] [4-85] [6-5] [7-31] [7-76] [7-77]
RUNWAY USE PROGRAM [3-60]
Runway Use Program [Glossary]
RUNWAY VISUAL RANGE [2-120]

[References are to Paragraph numbers]

Runway-In Use/Active Runway/Duty Runway [Glossary]

S

SAC EVASIVE ACTION MANEUVER [8-33]
SAC MITO OPERATIONS [8-35]
SAFETY ADVISORY [2-2] [2-6] [5-144] [5-190] [5-191] [5-215]
Safety Advisory [Glossary]
Sail Back [Glossary]
SAR MISSIONS [2-4] [5-29]
Say Again [Glossary]
Say Altitude [Glossary]
Say Heading [Glossary]
Sea Lane [Glossary]
SEA LANE OPERATIONS [3-150] [3-151] [3-152]
Search And Rescue Facility [Glossary]
SECONARY RADAR [2-37] [5-3] [5-70] [8-37]
SECTIONAL CHARTS [3-120] [7-4]
SECTOR [2-30] [2-40] [2-50] [2-51] [2-52] [2-53] [4-50] [5-11] [5-25] [5-31] [5-65] [5-192] [5-194] [5-195] [8-31] [8-70]
SECTOR BOUNDARY [8-70]
See And Avoid [Glossary]
Segmented Circle [Glossary]
Segments Of An Instrument Approach Procedure [Glossary]
SELECTED ALTITUDE LIMITS [5-194]
SELECTING ACTIVE RUNWAYS [3-3] [3-4]
Separation [Glossary]
Separation Minima [Glossary]
SEPARATION STANDARDS [1-9] [2-13] [4-90] [5-125] [5-190] [5-215] [7-33] [8-36] [10-16] [10-34]
SEVERE WEATHER [2-102] [2-103] [5-125] [5-126]
Severe Weather Avoidance Plan/SWAP [Glossary]
Short Range Clearance [Glossary]
Short Takeoff And Landing Aircraft/STOL Aircraft [Glossary]
SIDE-STEP APPROACH [4-86]
Sidestep Maneuver [Glossary]
SIGMET [2-101] [2-102]
Significant Meteorological Information/SIGMET [Glossary]
Simplified Directional Facility/SDF [Glossary]
Simulated Flameout/SFO [Glossary]
SIMULTANEOUS APPROACH [3-52] [3-93] [5-13] [5-113] [5-115] [5-126] [5-180] [7-31] [7-33]
SIMULTANEOUS DEPARTURES [5-113]
Simultaneous ILS Approaches [Glossary]
Single Direction Routes [Glossary]
Single Frequency Approach/SFA [Glossary]
Single-Piloted Aircraft [Glossary]
Slash [Glossary]
Slow Taxi [Glossary]
SPATIAL DISORIENTATION [4-63]
Speak Slower [Glossary]
Special Emergency [Glossary]
SPECIAL INTEREST FLIGHTS [8-10] [8-11] [8-12]
Special Use Airspace [Glossary]
SPECIAL USE AIRSPACE/SUA [1-4] [8-40] [8-41] [8-42] [8-43] [10-33]
SPECIAL USE FREQUENCIES [2-70] [8-31]
SPECIAL VFR CLEARANCE [9-3]
Special VFR Conditions [Glossary]
Special VFR Operations [Glossary]
SPEED [2-15] [2-52] [2-53] [2-84] [3-11] [3-53] [3-140] [4-45] [4-50] [4-61] [5-64] [5-65] [5-100] [5-101] [5-102] [5-104] [5-126] [5-212] [6-31] [7-33] [8-30] [8-70] [9-25] [10-10] [10-11]
Speed Adjustment [Glossary]
SPEED ADJUSTMENTS [2-52] [2-53] [2-84] [5-100] [5-101] [5-102] [5-104]
Speed Brakes/Dive Brakes [Glossary]
Squawk (Mode, Code, Function) [Glossary]
STAGE I SERVICE [7-60]
STAGE II SERVICE [5-13] [7-70] [7-90]
STAGE III SERVICE [1-4] [3-102] [7-10] [7-90] [7-92] [7-96]
Stand By [Glossary]
Standard Instrument Departure/SID [Glossary]
Standard Rate Turn [Glossary]
STANDARD TERMINAL ARRIVAL / STAR [2-17] [3-102] [4-5] [4-10] [4-14] [4-21] [4-22] [4-50] [4-51] [4-60] [5-91]
Standard Terminal Arrival/STAR [Glossary]
Stationary Reservations [Glossary]
Step Taxi [Glossary]
Step Turn [Glossary]
Stepdown Fix [Glossary]
Stereo Route [Glossary]
Stop Altitude Squawk [Glossary]
STOP AND GO APPROACH [3-20] [3-90]
Stop Squawk (Mode Or Code) [Glossary]
Stop Stream/Burst/Buzzer [Glossary]
Stop-And-Go [Glossary]
Stop-Over Flight Plan [Glossary]
Stopway [Glossary]
STORED FLIGHT PLAN PROGRAM [4-22] [5-197]
STRAIGHT-IN APPROACH [2-59] [3-6] [4-80] [5-125] [5-126] [5-152] [6-60] [7-49] [7-92] [10-13]
Straight-In Approach - IFR [Glossary]
Straight-In Approach - VFR [Glossary]
Straight-in Landing [Glossary]
STUDENT PILOTS [2-56]
Substitute Route [Glossary]
Sunset And Sunrise [Glossary]
SURVEILLANCE APPROACH [2-59] [5-7] [5-131] [5-135] [5-150] [5-152] [5-155] [5-168]
Surveillance Approach [Glossary]
SYSTEM DEVIATIONS [5-39] [5-64] [5-30]
System Strategic Navigation/SN [Glossary]

T

T-VOR/Terminal-Very High Frequency Omnidirectional Range Station [Glossary]
TACAN-Only Aircraft [Glossary]
Tactical Air Navigation/TACAN [Glossary]
TAKEOFF CLEARANCE [1-4] [1-20] [2-53] [2-59] [3-7] [3-31] [3-80] [3-81] [3-103] [3-104] [3-106] [3-107] [3-108] [3-109] [3-110] [3-123] [3-140] [3-141] [3-151] [4-14] [4-20] [4-21] [5-51] [5-111] [7-41] [7-46] [7-47] [8-35] [9-27] [10-3]
Target [Glossary]
Target Symbol [Glossary]
Taxi [Glossary]
Taxi Into Position And Hold [Glossary]
Taxi Patterns [Glossary]
TAXI PROCEDURES [1-4] [1-20] [2-86] [3-4] [3-33] [3-70] [3-71] [3-80] [3-81] [3-83] [3-84] [3-90] [3-100] [3-101] [3-103] [3-106] [3-108] [3-122] [3-123] [3-130] [3-131] [9-27] [10-4]

[*References are to Paragraph numbers*]

TEMPORARY FLIGHT RESTRICTION [9-6]
Terminal Area Facility [Glossary]
Terminal Area [Glossary]
TERMINAL CONTROL AREA / TCA [5-13] [7-10] [7-90] [7-94] [7-97]
TERMINAL INSTRUMENT APPROACH PROCEDURES [2-111] [3-84] [3-100] [3-121] [3-126] [4-71] [4-72] [4-85] [4-86] [5-72] [5-125] [5-130] [5-155] [5-181] [6-20] [7-2] [9-54]
Terminal RADAR Program [Glossary]
TERMINAL RADAR SERVICE AREA / TRSA [5-13] [7-90] [7-94] [7-96]
Terminal RADAR Service Area/TRSA [Glossary]
TERMINAL TRAFFIC INFORMATION [2-20] [2-87] [3-6] [3-81] [3-83] [3-92] [3-93] [3-103] [3-105] [3-123] [3-127] [3-131] [3-134] [7-3] [7-4] [7-79] [7-80]
Terrain Following/TF [Glossary]
Tetrahedron [Glossary]
That Is Correct [Glossary]
Threshold Crossing Height/TCH [Glossary]
Threshold [Glossary]
Time Group [Glossary]
TIMED APPROACH [4-80] [5-124] [6-60] [6-61] [6-62] [10-1]
Torching [Glossary]
Touch And Go/Touch And Go Landing [Glossary]
Touchdown [Glossary]
Touchdown Zone Elevation/TDZE [Glossary]
Touchdown Zone [Glossary]
TOWER EN ROUTE CONTROL / TEC [2-53] [4-52]
Tower En Route Control Service/Tower To Tower [Glossary]
TOWER RADAR DISPLAY [3-4] [3-6] [3-9] [5-62] [5-123] [7-77]
Tower/Airport Traffic Control Tower [Glossary]
TPX-42 [Glossary]
TPX-42 SYSTEM [5-37] [5-71] [5-220] [5-221] [5-222] [5-223] [5-224] [5-225] [5-226]
Track [Glossary]
Traffic Advisories [Glossary]
TRAFFIC ADVISORY [2-16] [2-21] [3-9] [5-3] [7-10] [7-60] [7-79] [7-96] [7-97] [8-70] [8-71] [8-83]
Traffic Alert [Glossary]
Traffic [Glossary]
Traffic In Sight [Glossary]
Traffic Information [Glossary]
Traffic No Longer A Factor [Glossary]
TRAFFIC PATTERN [2-4] [3-41] [3-120] [3-132] [4-21] [7-49] [7-76]
Traffic Pattern [Glossary]
TRAFFIC SIGNALS [1-4] [3-20] [3-21] [3-22] [3-80] [3-84] [3-131] [4-5] [4-44] [4-56] [9-3] [9-4] [9-10] [9-15] [9-16] [9-17] [9-26] [10-12]
Transcribed Weather Broadcast/TWEB [Glossary]
Transfer Of Control [Glossary]
Transferring Controller/Facility [Glossary]
Transition [Glossary]
Transmissometer [Glossary]
Transmitting In The Blind/Blind Transmission [Glossary]
TRANSPONDER EQUIPMENT [2-35] [2-57] [5-3] [5-20] [5-30] [5-33] [5-37] [5-39] [5-52] [8-70] [9-43]
Transponder [Glossary]
TRANSPONDER STANDBY OPERATION [5-32] [5-37] [5-52] [5-30]
Turbojet Aircraft [Glossary]
Turboprop Aircraft [Glossary]
TURBULENCE REPORTING [2-101] [2-102] [3-123] [6-52] [7-30] [7-34]

U

Ultrahigh Frequency/UHF [Glossary]
Unable [Glossary]
UNCONTROLLED AIRSPACE [4-34] [5-90]
Uncontrolled Airspace [Glossary]
Under-The-Hood [Glossary]
UNICOM [Glossary]
UNMANNED BALLOONS [8-70] [8-71]
Unpublished Route [Glossary]
Urgency [Glossary]

V

Vector [Glossary]
Verify [Glossary]
Verify Specific Direction Of Takeoff (Or Turns After Takeoff) [Glossary]
Vertical Separation [Glossary]
Vertical Takeoff And Landing Aircraft/VTOL Aircraft [Glossary]
Very High Frequency/VHF [Glossary]
Very Low Frequency/VLF [Glossary]
VFR Aircraft/VFR Flight [Glossary]
VFR ALTITUDES [7-21] [7-94]
VFR APPROACH CONTROL SERVICE [5-133] [7-3] [7-30] [7-32] [7-60]
VFR Conditions [Glossary]
VFR DEPARTURE CLEARANCE [4-17]
VFR FLIGHT FOLLOWING [3-123] [4-62] [5-39] [5-51] [7-2] [9-24]
VFR FLIGHT PLAN [2-4] [2-32] [2-34] [2-56] [2-77] [4-17] [4-27] [5-29] [5-39] [7-2] [7-20] [8-22] [9-3] [9-50]
VFR Military Training Routes/VR [Glossary]
VFR Not Recommend [Glossary]
VFR OPERATIONS [2-4] [2-21] [2-32] [2-57] [3-9] [3-92] [3-93] [3-123] [4-17] [4-27] [4-54] [4-62] [4-88] [4-90] [4-91] [5-25] [5-29] [5-33] [5-39] [5-90] [5-133] [5-180] [7-32] [7-40] [7-41] [7-44] [7-46] [7-47] [7-49] [7-79] [7-92] [8-10] [8-11] [8-22] [8-26] [8-35] [9-3] [9-22] [10-2] [10-14] [10-15] [10-16]
VFR-On-Top [Glossary]
VIDEO MAP [5-7] [5-9] [5-51] [9-31]
Video Map [Glossary]
Visibility [Glossary]
VISIBILITY OBSERVATIONS [2-105]
VISUAL APPROACH [2-19] [2-20] [2-59] [3-42] [3-121] [4-62] [4-63] [4-65] [4-71] [4-72] [4-80] [5-13] [7-10] [7-30] [7-31] [7-32] [7-33] [7-76] [10-16] [10-35]
Visual Approach [Glossary]
Visual Descent Point/VDP [Glossary]
Visual Flight Rules/VFR [Glossary]
Visual Holding [Glossary]
Visual Meteorological Conditions/VMC [Glossary]
VISUAL SEPARATION [2-19] [2-20] [3-9] [3-92] [5-124] [5-126] [7-1] [7-10] [7-30] [7-31] [7-32] [7-33] [7-48] [7-92] [10-1] [10-3] [10-14]
Visual Separation [Glossary]
VOID TIME [4-23] [9-14]

VOR/Very High Frequency Omnidirectional Range Station [Glossary]
VORTAC/VHF Omnidirectional Range/Tactical Air Navigation [Glossary]
Vortices/Wing-Tip Vortices [Glossary]
VOT/VOR Test Signal [Glossary]

W

WAKE TURBULENCE [1-4] [1-23] [2-19] [2-20] [3-82] [3-93] [3-106] [3-107] [3-108] [3-122] [3-123] [3-140] [3-141] [3-145] [5-72] [5-74] [6-4] [6-5] [6-64] [7-30] [7-34] [9-6] [10-31] [10-34]
Wake Turbulence [Glossary]
WARNING AREA [5-33] [6-42]
Weather Advisory/WS/WA [Glossary]
WEATHER BROADCAST [2-101] [3-34] [3-100] [4-64] [4-72] [5-131]
WEATHER FORECAST [2-102] [4-50]
WEATHER MINIMUMS [2-105] [2-122] [3-100] [3-121] [4-50] [4-64] [4-67] [4-72] [5-125] [5-126] [5-131] [6-64] [6-66] [7-31] [7-34] [7-35] [9-10] [9-24] [9-50] [9-54] [10-15]
WEATHER OBSERVATIONS [2-105] [4-67] [4-72] [5-131]
WEATHER RADAR [2-103] [2-106] [4-64] [5-120] [5-125] [5-126] [5-130] [5-131] [5-133] [5-141] [5-180] [5-30] [6-61] [6-64] [6-66] [7-10] [7-31] [7-32] [7-34] [7-77] [9-13] [9-24] [9-50] [9-55]
WEATHER REPORTS [2-102] [2-105] [2-106] [2-111] [4-67] [4-82] [5-133] [5-141] [6-63] [7-30] [7-31] [7-32]
WHEEL DOWN CHECK [3-124] [5-140] [5-183]
WILCO [Glossary]
WIND DIRECTION [1-20] [2-84] [3-62] [3-126] [5-125] [5-126] [7-80]
WIND SHEAR [2-102] [2-103] [3-8] [3-120] [5-125] [5-126]
Wind Shear [Glossary]
Words Twice [Glossary]

☆U.S. GOVERNMENT PRINTING OFFICE: 1984 461 828 10008

Ai 7/3/984/Ch.2

CHANGE

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

7110.65D CHG 2

3/14/85

NEWARK PUBLIC LIBRARY
MAR 21 1985
U. S. GOVT. PUBS.
DEPOSITORY 376

SUBJ: AIR TRAFFIC CONTROL

1. PURPOSE. This change transmits revised pages for Order 7110.65D, Air Traffic Control.

2. EFFECTIVE DATE. This change is effective June 6, 1985.

3. EXPLANATION OF CHANGES. The significant changes are listed below. If more information is desired, contact the office in the parentheses that follow the explanation.

a. 1-24. ABBREVIATIONS. Adds ARSA, Airport Radar Service Area. See cc. (ATO-320.2)

b. 2-59. CONTROL SYMBOLOGY.
(1) Table 2.--Miscellaneous Abbreviations. Adds RH, Runway Heading. (ATO-364)

(2) Table 3.--Control Information Symbols. Deletes Special IFR from the control zone descriptors. (ATO-320.5)

c. 2-72. PILOT ACKNOWLEDGMENT/READBACK. Explains that pilots may acknowledge clearances, instructions, or information by using "Wilco," "Roger," "Affirmative," or other remarks. (ATO-330.8)

d. 2-87. AIRCRAFT IDENTIFICATION. Allows controllers to use "November" when communicating with civil aircraft of U.S. registry. (ATO-300)

e. 3-8. LOW LEVEL WIND SHEAR ADVISORIES. Incorporates the provisions of Notice 7110.907, dated 8/23/84. (ATO-320)

f. 3-12. VISUALLY SCANNING RUNWAYS. Adds a new paragraph which reiterates local control responsibility to visually scan runways and charges ground control to assist local control in visually scanning runways. (ATO-320.6)

g. 3-22. RECEIVER-ONLY ACKNOWLEDGMENT. Provides for receiver-only acknowledgment by helicopters. (ATO-320.10)

h. 3-60. SELECTION (Runway). Adds a procedure which will alert aircraft to an operation on a runway other than the advertised active runway. (ATO-320.6)

Distribution: ZAT-710 (ALL)
ZAT-423 (ALL)

Initiated By: ATO-300

TD 4.308:

i. 3-90. SEQUENCING/SPACING APPLICATION. Provides an additional method for sequencing and spacing helicopters. (ATO-320.10)

j. 3-93. SIMULTANEOUS OPPOSITE DIRECTION OPERATION. Relocates subparagraphs 3-93d.,e., and f. to 3-106 i., j., and k. (ATO-320.5)

k. 3-106. SAME RUNWAY SEPARATION (Departures). Provides an alternative to distance minima when the succeeding aircraft is a helicopter, and includes subparagraphs i., j., and k which were relocated from 3-93. (ATO-320.10 and 320.5)

l. 3-122. SAME RUNWAY SEPARATION (Arrivals). Provides an alternate to distance minima when the succeeding aircraft is a helicopter. (ATO-320.10)

m. 4-5. FIX USE. Provides definitive information on the limitations of TACAN-only aircraft. (ATO-330.7)

n. 4-21. DEPARTURE CLEARANCES. Clarifies the meaning of "assigned en route altitude." (ATO-330)

o. 4-22. ABBREVIATED DEPARTURE CLEARANCE. See n.

p. 4-23. DEPARTURE RESTRICTIONS CLEARANCE VOID TIMES, AND HOLD FOR RELEASE. Standardizes the use of "hold for release." (ATO-330.5)

q. 4-30. ROUTE USE. Adds subparagraph j. which had been inadvertently dropped in the printing of 7110.65D. (ATO-210)

r. 5-11. RADAR FIX POSTING. Deletes the requirement to record the observed position during full NAS Stage A operation. (ATO-330)

s. 5-13. RADAR SERVICE TERMINATION. Adds ARSA to 5-13b(1). See cc.

t. 5-55. POSITION INFORMATION. Makes the language consistent with that in paragraph 5-52. (ATO-330.2)

u. 5-64. TRANSFERRING CONTROLLER HANDOFF. Eliminates intrafacility verbal coordination to identify a primary or nondiscrete target during an automated handoff function while using a multi-sensor, mosaicked RDP system. (ATO-330.5)

v. 5-102. MINIMA (Speed Adjustment). Clarifies the distinction between turbojet and reciprocating engine/turboprop aircraft, and provides a speed adjustment procedure for helicopters. (ATO-320.10)

w. 5-103. LIMITATIONS (Speed Adjustment). Add "KNOTS" to the phraseology. (ATO-300)

x. 5-131. APPROACH INFORMATION. Requires that the approach to be flown be specified when a helicopter executes a PAR approach to a runway that has both a copter and a conventional Category A PAR approach. (ATO-320.10)

y. 5-210. APPLICATION (ARTS). Adds "USN" and "DAIR" to the note. (ATO-320.6)

z. 7-2. VFR CONDITIONS. Deletes the annotation "TERMINAL" from subparagraph 7-2a(3). (ATO-330)

aa. 7-10. VISUAL SEPARATION. Adds ARSA to 7-10c Note. See cc.

bb. 7-31. VISUAL APPROACHES--RADAR. Adds ARSA to 7-31a(3). See cc.

cc. 7-100. APPLICATION (ARSA). Establishes a new section of seven paragraphs which describe the procedures for the provision of Airport Radar Service Area (ARSA) services. The ARSA concept has been confirmed and adopted as a national replacement for the Terminal Radar Service Area (TRSA) program. (ATO-320.2)

dd. 7-101. ISSUANCE OF EFC (ARSA) See cc.

ee. 7-102. SEPARATION (ARSA). See cc.

ff. 7-103. HELICOPTER TRAFFIC (ARSA). See cc.

gg. 7-104. ALTITUDE ASSIGNMENTS (ARSA). See cc.

hh. 7-105. APPROACH INTERVAL (ARSA). See cc.

ii. 7-106. ARSA DEPARTURE INFORMATION. See cc.

jj. Appendix A. PILOT/CONTROLLER GLOSSARY.

(1) Acknowledge. Deletes the phrase "and understand" from the definition. (ATO-330.8)

(2) Conflict Resolution. Describes the separation procedures used between an IFR aircraft and a VFR aircraft in both ARSA airspace and the associated outer area. (ATO-320.2)

(3) Controlled Airspace--Airport Radar Service Area. Adds a definition of ARSA. (ATO-320.2)

(4) Direct Altitude and Identity Readout/DAIR. Corrects the title from "Direction" to "Direct." (ATO-320.6)

(5) Outer Area. Adds a definition. (ATO-320.2)

4. **DISPOSITION OF TRANSMITTAL.** Retain this transmittal until it is superseded by a new basic order.

5. **PAGE CONTROL CHART.** See the attachment for the Page Control Chart.

for Walter H. Mitchell

John R. Ryan
Acting Director, Air Traffic
Operations Service

PAGE CONTROL CHART

DELETE PAGES	DATED:	INSERT PAGES DATED 6/6/85
iii and iv	10/25/84	iii and iv
1-3 and 1-4	10/25/84	1-3 and 1-4
2-i	10/25/84	2-i and 2-ii
2-ii	2/14/85	
2-2	10/25/84	2-2
2-6 through 2-16	10/25/84	2-6 through 2-25 (and 2-26)
2-17 through 2-26	2/14/85	
3-i through 3-iii	10/25/84	3-i through 3-iii
3-2 and 3-3	10/25/84	3-2 through 3-6
3-4	2/14/85	
3-5 and 3-6	10/25/84	
3-9	10/25/84	3-9
3-12	10/25/84	3-12
3-15	2/14/85	3-15
3-17 and 3-18	2/14/85	3-17 and 3-18
3-20 through 3-23	10/25/84	3-20 through 3-23
3-25	10/25/84	3-25 and 3-26
3-26	2/14/85	
3-28	10/25/84	3-28
4-i and 4-ii	10/25/84	4-i and 4-ii
4-2	10/25/84	4-2
4-6 through 4-10	10/25/84	4-6 through 4-27
4-11 and 4-12	2/14/85	
4-13 through 4-17	10/25/84	
4-18 and 4-19	2/14/85	
4-20	10/25/84	
4-21 and 4-22	2/14/85	
4-23 through 4-26	10/25/84	
5-i through 5-iv	10/25/84	5-i through 5-iv
5-2 and 5-3	10/25/84	5-2 and 5-3
5-6	10/25/84	5-6
5-11	10/25/84	5-11
5-13 and 5-14	10/25/84	5-13 and 5-14

PAGE CONTROL CHART

DELETE PAGES	DATED:	INSERT PAGES DATED 6/6/85
5-18	10/25/84	5-18
5-21 and 5-22	10/25/84	5-21 and 5-22
5-29 through 5-35	10/25/84	5-29 through 5-35
5-37	10/25/84	5-37
5-39	10/25/84	5-39
5-41	10/25/84	5-41
5-43	10/25/84	5-43
7-i and 7-ii	10/25/84	7-i and 7-ii
7-1 through 7-4	10/25/84	7-1 through 7-4
7-7	10/25/84	7-7
7-11 and 7-12	10/25/84	7-11 and 7-12
7-14	10/25/84	7-14 through 7-16
7-15	2/14/85	
Appendix A		Appendix A
A-1	2/14/85	A-1 through A-42
A-2 through A-21	10/25/84	
A-22	2/14/85	
A-23 through A-37	10/25/84	
A-38 through A-41	2/14/85	
Index		Index
I-1 through I-11	2/14/85	I-1 through I-15

COMPENDIUM

Page

FOREWORD i
EXPLANATION OF THE REORGANIZED HANDBOOK vii
CROSS-REFERENCE INDEX xi

Chapter 1. INTRODUCTION

TABLE OF CONTENTS 1-i
Section 1. GENERAL 1-1
Section 2. TERMS OF REFERENCE 1-3

Chapter 2. GENERAL

TABLE OF CONTENTS 2-i
Section 1. GENERAL 2-1
Section 2. FLIGHT PLANS AND CONTROL INFORMATION 2-8
Section 3. FLIGHT PROGRESS STRIPS 2-12
Section 4. RADIO AND INTERPHONE COMMUNICATIONS 2-19
Section 5. ROUTE AND NAVAID DESCRIPTION 2-26
Section 6. WEATHER INFORMATION 2-27
Section 7. ALTIMETER SETTINGS 2-30
Section 8. RUNWAY VISIBILITY REPORTING—*TERMINAL* 2-31

Chapter 3. AIRPORT TRAFFIC CONTROL — *TERMINAL*

TABLE OF CONTENTS 3-i
Section 1. GENERAL 3-1
Section 2. VISUAL SIGNALS 3-4
Section 3. AIRPORT CONDITIONS 3-5
Section 4. AIRPORT LIGHTING 3-8
Section 5. RUNWAY SELECTION 3-12
Section 6. AIRPORT SURFACE DETECTION PROCEDURES 3-13
Section 7. TAXI AND GROUND MOVEMENT PROCEDURES 3-14
Section 8. SPACING AND SEQUENCING 3-17
Section 9. DEPARTURE PROCEDURES AND SEPARATION 3-19
Section 10. ARRIVAL PROCEDURES AND SEPARATION 3-24
Section 11. HELICOPTER OPERATIONS 3-30
Section 12. SEA LANE OPERATIONS 3-33

Chapter 4. IFR

TABLE OF CONTENTS 4-i
Section 1. NAVAID USE LIMITATIONS 4-1
Section 2. CLEARANCES 4-3
Section 3. DEPARTURE PROCEDURES 4-5
Section 4. ROUTE ASSIGNMENT 4-10
Section 5. ALTITUDE ASSIGNMENT AND VERIFICATION 4-12
Section 6. HOLDING AIRCRAFT 4-16
Section 7. ARRIVAL PROCEDURES 4-19
Section 8. APPROACH CLEARANCE PROCEDURES 4-24

Chapter 5. RADAR

TABLE OF CONTENTS 5-i
Section 1. GENERAL 5-1
Section 2. BEACON SYSTEMS 5-4
Section 3. RADAR IDENTIFICATION 5-10
Section 4. TRANSFER OF RADAR IDENTIFICATION 5-12
Section 5. RADAR SEPARATION 5-15
Section 6. VECTORING 5-18
Section 7. SPEED ADJUSTMENT 5-20

COMPENDIUM—Continued

Page
Section 8. RADAR DEPARTURES 5-22
Section 9. RADAR ARRIVALS 5-25
Section 10. RADAR APPROACHES—*TERMINAL* 5-29
Section 11. SURVEILLANCE APPROACHES—*TERMINAL* 5-33
Section 12. PAR APPROACHES—*TERMINAL* 5-35
Section 13. USE OF PAR FOR APPROACH MONITORING—*TERMINAL* 5-37
Section 14. AUTOMATION—*EN ROUTE* 5-39
Section 15. AUTOMATED RADAR TERMINAL SYSTEMS (ARTS)—*TERMINAL* 5-41
Section 16. TPX-42—*TERMINAL* 5-43

Chapter 6. NONRADAR

TABLE OF CONTENTS 6-i
Section 1. GENERAL 6-1
Section 2. INITIAL SEPARATION OF SUCCESSIVE DEPARTING AIRCRAFT 6-2
Section 3. INITIAL SEPARATION OF DEPARTING AND ARRIVING AIRCRAFT 6-4
Section 4. LONGITUDINAL SEPARATION 6-5
Section 5. LATERAL SEPARATION 6-9
Section 6. VERTICAL SEPARATION 6-12
Section 7. TIMED APPROACHES 6-13

Chapter 7. VISUAL

TABLE OF CONTENTS 7-i
Section 1. GENERAL 7-1
Section 2. VISUAL SEPARATION 7-2
Section 3. VFR-ON-TOP 7-3
Section 4. APPROACHES 7-4
Section 5. SPECIAL VFR 7-7
Section 6. BASIC RADAR SERVICE TO VFR AIRCRAFT—*TERMINAL* 7-11
Section 7. STAGE II SERVICE—*TERMINAL* 7-12
Section 8. STAGE III SERVICE—*TERMINAL* 7-14
Section 9. AIRPORT RADAR SERVICE AREA (ARSA) SERVICE—*TERMINAL* 7-16

Chapter 8. SPECIAL FLIGHTS

TABLE OF CONTENTS 8-i
Section 1. GENERAL 8-1
Section 2. SPECIAL INTEREST FLIGHTS 8-2
Section 3. SPECIAL OPERATIONS 8-4
Section 4. SPECIAL USE AND ATC ASSIGNED AIRSPACE 8-11
Section 5. FUEL DUMPING 8-13
Section 6. JETTISONING OF EXTERNAL STORES 8-14
Section 7. UNMANNED FREE BALLOONS 8-15
Section 8. PARACHUTE JUMPING 8-17

Chapter 9. EMERGENCIES

TABLE OF CONTENTS 9-i
Section 1. GENERAL 9-1
Section 2. EMERGENCY ASSISTANCE 9-3
Section 3. CONTROL ACTIONS 9-9
Section 4. DIRECTION FINDER SERVICE 9-10
Section 5. MISCELLANEOUS OPERATIONS 9-13
Section 6. GROUND MISSILE EMERGENCIES 9-14

Chapter 10. CANADIAN AIRSPACE PROCEDURES

TABLE OF CONTENTS 10-i
Section 1. GENERAL CONTROL 10-1
Section 2. IFR OPERATIONS 10-3
Section 3. RADAR OPERATIONS 10-6
Section 4. FUEL DUMPING 10-8

Section 2. TERMS OF REFERENCE

1-20 WORD MEANINGS

As used in this manual:

a. *Shall,* or an action verb in the imperative sense, means a procedure is mandatory.

1-20 Examples. —

Issue an alternative clearance.

Authorize the aircraft to taxi.

The transferring controller *shall forward* these data to the receiving controller.

Do not clear an aircraft to land or takeoff from a closed runway.

b. *Should* means a procedure is recommended.

c. *May* or *need not* means a procedure is optional.

d. *Will* means futurity, not a requirement for application of a procedure.

e. Singular words include the plural.

f. Plural words include the singular.

g. *Aircraft* means the airframe, crew members, or both.

h. *Approved separation* means separation in accordance with the applicable minima in this manual.

i. *Altitude* means altitude mean sea level, flight level, or both.

j. *Miles* means nautical miles unless otherwise specified, and means statute miles in conjunction with visibility.

k. *Course, Bearing, Heading, and Wind Direction* information shall always be magnetic unless specifically stated otherwise.

l. *Time* when used in the context of a clock reading is the hour in Greenwich Mean Time (GMT) or the local equivalent, as appropriate, and the minutes. Change to the next minute is made at the minute plus 30 seconds, except time checks are given to the nearest quarter minute.

1-21 NOTES

Statements of fact, of a prefatory or explanatory nature relating to directive material, are set forth as notes.

1-22 REFERENCES

As used in this handbook, references direct attention to an additional source of information.

1-23 ANNOTATIONS

Revised, reprinted, or new pages are marked as follows:

a. The change number and effective date are printed on each revised or additional page.

b. Bold vertical lines in the margin of changed pages indicate the location of either substantive or editorial revisions to the handbook.

c. Paragraphs/sections annotated with *EN ROUTE* or *TERMINAL* are only to be applied by the designated type facility. When they are not so designated, the paragraphs/sections apply to both type (en route and terminal) facilities.

d. The annotation, *USAF* for U.S. Air Force, *USN* for U.S. Navy, and *USA* for U.S. Army denotes that the procedure immediately following applies only to the service designated.

1-23d Reference. — Military Procedures, 2-12.

e. *WAKE TURBULENCE APPLICATION* inserted within a paragraph means that the remaining information in the paragraph requires the application of wake turbulence procedures.

1-24 ABBREVIATIONS

As used in this manual, the following abbreviations have the meanings indicated.

Abbreviation	*Meaning*
ACLS	Automatic Carrier Landing System
ACP	Area Command Post
ADC	Aerospace Defense Command
AIM	Airman's Information Manual
AIRMET	Airmen's meteorological information
ALNOT	Alert notice
ALS	Approach light system
ALTRV	Altitude reservation
AMB	Ambiguity — A disparity greater than 2 miles exists between the position declared for a target by ARTS and another facility's computer declared position during interfacility handoff
ANG	Air National Guard
APREQ	Approval request
ARAC	Radar approach control facility (USA)
ARCP	Air refueling control point
ARINC	Aeronautical Radio Incorporated
ARIP	Air refueling initial point
ARSA	Airport Radar Service Area
ARSR	Air route surveillance radar
ARTCC	Air route traffic control center
ASDE	Airport surface detection equipment
ASR	Airport surveillance radar
ATC	Air traffic control
ATCAA	ATC assigned airspace
ATCCC	Air Traffic Control Command Center
ATCRBS	Air traffic control radar beacon system
ATCT	Airport traffic control tower

Abbreviation	*Meaning*
ATIS	Automatic terminal information service
ATPAC	Air Traffic Procedures Advisory Committee
ATS	Air Traffic Service
CACT	Civil air carrier turbojet
CARF	Central Altitude Reservation Function
CAT	Clear air turbulence
CELNAV	Celestial navigation training
CCC	Regional Communications Control Center
CERAP	Combined Center/RAPCON
CFCF	Central Flow Control Function
CWA	Center Weather Advisory
DF	Direction finder
DH	Decision height
DMAAC	Defense Mapping Agency Aerospace Center
DMAHC	Defense Mapping Agency Hydrographic Center
DME	Distance measuring equipment compatible with TACAN
DOE	Department of Energy
ECM	Electronic counter measure
EFAS	En route flight advisory service
EFC	Expect further clearance
ELT	Emergency locator transmitter
EOVM	Emergency obstruction video map
ETA	Estimated time of arrival
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FDEP	Flight data entry and printout
FIFO	Flight Inspection Field Office
FIR	Flight information region
FL	Flight level
FLIP	Flight Information Publication
FRC	Full route clearance necessary
FSDO	Flight Standards District Office
FSNFO	Flight Standards National Field Office
FSS	Flight service station
FTS	Federal Telecommunications System
FW/SVFR	Fixed-Wing Special Visual Flight Rules
GCA	Ground controlled approach
HIRL	High intensity runway lights
ICAO	International Civil Aviation Organization
IDENT	Aircraft identification
IFR	Instrument flight rules
IFSS	International flight service station
INF	Inland Navigation Facility
INREQ	Information request
IR	IFR military training route
JATO	Jet assisted takeoff
L/MF	Low/medium frequency
LAWRS	Limited aviation weather reporting station
LLWAS	Low level wind shear alert system
MALS	Medium intensity approach light system
MALSR	Medium approach light system with runway alignment indicator lights
MAP	Missed approach point
MARSA	Military authority assumes responsibility for separation of aircraft
MCA	Minimum crossing altitude
MDA	Minimum descent altitude
MEA	Minimum en route (IFR) altitude
MIRL	Medium intensity runway lights
MITO	Minimum interval takeoff
MOA	Military operations area
MOCA	Minimum obstruction clearance altitude
MSAW	Minimum Safe Altitude Warning
MRA	Minimum reception altitude
MSL	Mean sea level
MTI	Moving target indicator
MTR	Military training route
MVA	Minimum vectoring altitude
NAR	North American Route
NAS	National Airspace System
NAT	Not ARTS tracked (ARTS is not tracking the target and no ambiguity check can be made)
NBCAP	National Beacon Code Allocation Plan
NDB	Nondirectional radio beacon
NOAA	National Oceanic and Atmospheric Administration
NORAD	North American Air Defense Command
NOS	National Ocean Service
NWS	National Weather Service
NTZ	No transgression zone
ODALS	Omnidirectional approach lighting system
PAR	Precision approach radar
PDAR	Preferential departure arrival route
PBCT	Proposed Boundary Crossing Time
PCA	Positive control area
PAR	Preferential arrival route (Stage A)
PDR	Preferential departure route
PIDP	Programmable Indicator Data Processor
RAC	Department of Energy special flight
RAIL	Runway alignment indicator lights
RAPCON	Radar approach control facility (USAF)
RATCF	Radar air traffic control facility (USN)
RBS	Radar bomb scoring
RCC	Rescue Coordination Center
RCLS	Runway centerline system
RCR	Runway condition reading
REIL	Runway end identifier lights
RNAV	Area Navigation
RVR	Runway visual range
RVV	Runway visibility value
SAC	Strategic Air Command
SAFI	Semi-automatic flight inspection
SAR	Search and rescue
SFA	Single frequency approach
SFO	Simulated flameout
SID	Standard instrument departure
SIGMET	Significant meteorological information
STAR	Standard terminal arrival
STOL	Short takeoff and landing

TABLE OF CONTENTS

Page

Chapter 2. GENERAL

Section 1. GENERAL

2-1 ATC Service 2-1
2-2 Duty Priority 2-1
2-3 Procedural Preference 2-1
2-4 Operational Priority 2-1
2-5 Expeditious Compliance 2-2
2-6 Safety Advisory 2-2
2-7 In-Flight Equipment Malfunctions 2-3
2-8 Minimum Fuel 2-3
2-9 Reporting Essential Flight Information 2-3
2-10 NAVAID Malfunctions 2-3
2-11 Use of MARSA 2-3
2-12 Military Procedures 2-4
2-13 Formation Flights 2-4
2-14 Coordinate Use of Airspace 2-4
2-15 Control Transfer 2-4
2-16 Airport Traffic Areas 2-4
2-17 Radio Communications Transfer 2-5
2-18 Operational Requests 2-5
2-19 Wake Turbulence 2-5
2-20 Wake Turbulence Cautionary Advisories 2-6
2-21 Traffic Advisories 2-6
2-22 Bird Activity Information 2-7
2-23 Transfer of Position Responsibility 2-7
2-24—2-29 Reserved 2-7

Section 2. FLIGHT PLANS AND CONTROL INFORMATION

2-30 Recording Information 2-9
2-31 Forwarding Information 2-9
2-32 Forwarding VFR Data 2-9
2-33 Military DVFR Departures 2-9
2-34 IFR to VFR Flight Plan Change 2-9
2-35 IFR Flight Progress Data 2-9
2-36 Manual Input of Computer Assigned Beacon Codes 2-10
2-37 ALTRV Information 2-10
2-38 Computer Message Verification 2-10
2-39 Transmit Proposed Flight Plan 2-10
2-40 Forwarding Amended and UTM Data 2-11
2-41 Airborne Military Flights 2-11
2-42 Forwarding Flight Plan Data Between U.S. ARTCC's and Canadian ACC's 2-11
2-43 Teletype Flight Data Format—U.S. ARTCCs—Canadian ACC 2-11
2-44—2-49 Reserved 2-12

Section 3. FLIGHT PROGRESS STRIPS

2-50 General 2-13
2-51 Arrangement of Postings 2-13
2-52 Data Entries 2-14
2-53 Data Entries 2-15
2-54 Aircraft Identify 2-15
2-55 Aircraft Type 2-16
2-56 USAF/USN Undergraduate Pilots 2-16
2-57 Aircraft Equipment Suffix 2-16
2-58 Clearance Status 2-16

TABLE OF CONTENTS—Continued

Page

2-59 Control Symbology 2-16
2-60—2-69 Reserved 2-18

Section 4. RADIO AND INTERPHONE COMMUNICATIONS

2-70 Radio Communications 2-19
2-71 Monitoring 2-19
2-72 Pilot Acknowledgement/Readback 2-19
2-73 Authorized Interruptions 2-19
2-74 Authorized Transmissions 2-19
2-75 Authorized Relays 2-19
2-76 Radio Message Format 2-19
2-77 Abbreviated Transmissions 2-20
2-78 Interphone Transmission Priorities 2-20
2-79 Priority Interruption 2-20
2-80 Interphone Message Format 2-20
2-81 Interphone Message Termination 2-20
2-82 Words and Phrases 2-20
2-83 Emphasis for Clarity 2-20
2-84 ICAO Phonetics 2-20
2-85 Numbers Usage 2-21
2-86 Facility Identification 2-21
2-87 Aircraft Identification 2-22
2-88 Description of Aircraft Types 2-23
2-89 Reserved 2-25

Section 5. ROUTE AND NAVAID DESCRIPTION

2-90 Airways and Routes 2-26
2-91 NAVAID Terms 2-26
2-92 NAVAID Fixes 2-26
2-93—2-99 Reserved 2-26

Section 6. WEATHER INFORMATION

2-100 Familiarization 2-28
2-101 SIGMET or CWA Alert 2-28
2-102 PIREP Information 2-28
2-103 Weather and Chaff Services 2-29
2-104 Calm Wind Conditions 2-29
2-105 Reporting Weather Conditions 2-29
2-106 Disseminating Weather Information 2-30
2-107—2-109 Reserved 2-30

Section 7. ALTIMETER SETTINGS

2-110 Current Settings 2-31
2-111 Altimeter Settings Issuance Below Lowest Usable FL 2-31
2-112—2-119 Reserved 2-31

Section 8. RUNWAY VISIBILITY REPORTING — *TERMINAL*

2-120 Furnish RVR/RVV Values 2-32
2-121 Arrival/Departure Runway Visibility 2-32
2-122 Terminology 2-32

Chapter 2. GENERAL CONTROL

Section 1. GENERAL

2-1 ATC SERVICE

Provide air traffic control service in accordance with the procedures and minima in this handbook except when:

a. Deviation is necessary to conform with ICAO Documents, National Rules of the Air, or special agreements where the United States provides air traffic control service in airspace outside the United States and its possessions.

2-1a Note. — Pilots are required to abide by FAR's or other applicable regulations regardless of the application of any procedure or minima in this handbook.

b. Other procedures/minima are prescribed in a letter of agreement, an FAA, or a military document.

2-1b Note. — These procedures may include altitude reservations, air refueling, and fighter interceptor operations.

2-1b Reference. — Procedural Letters of Agreement, 1-8.

2-2 DUTY PRIORITY

a. Give first priority to separating aircraft and issuing safety advisories as required in this handbook. Good judgment shall be used in prioritizing all other provisions of this handbook based on the requirements of the situation at hand.

2-2a Note. — Because there are many variables involved, it is virtually impossible to develop a standard list of duty priorities that would apply uniformly to every conceivable situation. Each set of circumstances must be evaluated on its own merit and when more than one action is required, the controller shall exercise his best judgment based on the facts and circumstances known to him. That action which is most critical from a safety standpoint is performed first.

b. Provide additional services to the extent possible, contingent only upon higher priority duties and other factors including limitations of radar, volume of traffic, frequency congestion, and workload.

2-2b Note. — The primary purpose of the ATC system is to prevent a collision between aircraft operating in the system and to organize and expedite the flow of traffic. In addition to its primary function, the ATC system has the capability to provide (with certain limitations) additional services. The ability to provide additional services is limited by many factors, such as the volume of traffic, frequency congestion, quality of radar, controller workload, higher priority duties, and the pure physical inability to scan and detect those situations that fall in this category. It is recognized that these services cannot be provided in cases in which the provision of services is precluded by the above factors. Consistent with the aforementioned conditions, controllers shall provide additional service procedures to the extent permitted by higher priority duties and other circumstances. The provision of additional services is not optional on the part of the controller, but rather is required when the work situation permits.

2-3 PROCEDURAL PREFERENCE

a. Use automation procedures in preference to nonautomation procedures when workload, communications, and equipment capabilities permit.

b. Use radar separation in preference to nonradar separation when it will be to an operational advantage and workload, communications, and equipment permit.

c. Use nonradar separation in preference to radar separation when the situation dictates that an operational advantage will be gained.

2-3c Note. — One situation may be where vertical separation would preclude excessive vectoring.

2-4 OPERATIONAL PRIORITY

Provide air traffic control service to aircraft on a "first come, first served" basis as circumstances permit, except the following:

2-4 Note. — It is solely the pilot's prerogative to cancel his IFR flight plan. However, a pilot's retention of an IFR flight plan does not afford priority over VFR aircraft. For example, this does not preclude the requirement for the pilot of an arriving IFR aircraft to adjust his flight path, as necessary, to enter a traffic pattern in sequence with arriving VFR aircraft.

2-4 Reference — FAR 91.67(b), An aircraft in distress has the right of way over all other air traffic.

a. Provide priority to civilian air ambulance flights (LIFEGUARD). When requested, provide priority to military air evacuation flights (AIR EVAC, MED EVAC). Assist the pilots of air ambulance/evacuation aircraft to avoid areas of significant weather and turbulent conditions. When requested by a pilot, provide notifications to expedite ground handling of patients, vital organs, or urgently needed medical materials.

b. Provide maximum assistance to SAR aircraft performing a SAR mission.

2-4b Reference. — Providing Assistance, 9-3.

c. Provide special handling, as required to expedite Flight Check and SAFI aircraft.

2-4c Note. — It is recognized that unexpected wind conditions, weather, or heavy traffic flows may affect controller's ability to provide priority or special handling at the specific time requested.

2-4c Reference. — Flight Check and SAFI Aircraft, 8-3.

d. Expedite the movement of Presidential aircraft and entourage and any rescue support aircraft as well as related control messages when traffic conditions and communications facilities permit.

2-4d Note. — As used herein the terms Presidential aircraft and entourage include aircraft and entourage of the President, Vice President, or other public figures when designated by the White House.

2-4d Reference. — Presidential and Vice Presidential Aircraft, 2-87e. and f. Order 7210.3 — 600, Advance Coordination.

e. Expedite movement of NIGHT WATCH aircraft when NEACP (pronounced KNEECAP) is indicated in the remarks section of the flight plan or in air/ground communications.

2-4e Note. — The term "NEACP" will not be a part of the call sign but may be used when the aircraft is airborne to indicate a request for special handling.

2-4e Reference. — Order 7610.4 — 1480.

f. Provide expeditious handling for any civil or military aircraft using the code name "FLYNET."

2-4f Reference. — FLYNET, 8-25. Order 7610.4 — 1522.

g. Provide expeditious handling of aircraft using the code name "Garden Plot" only when CARF notifies you that such priority is authorized. Refer any questions regarding flight procedures to CARF for resolution.

2-4g Note. — Garden Plot flights require priority movement and are coordinated by the military with CARF. State authority will contact the Regional Director to arrange for priority of National Guard troop movements within a particular State.

h. Provide special handling for USAF aircraft engaged in aerial sampling missions using the code name "SAMP".

2-4h Reference — SAMP, 8-36. Order 7210.3 — 633, Atmospheric Sampling for Nuclear Contamination. Order 7610.4 — 1524

i. IFR aircraft shall have priority over SVFR aircraft.

2-4i Reference. — Special VFR, Chapter 7, Section 5.

2-5 EXPEDITIOUS COMPLIANCE

a. Use the word "immediately" only when expeditious compliance is required to avoid an imminent situation.

b. Use the word "expedite" only when prompt compliance is required to avoid the development of an imminent situation.

c. In either case and if time permits, include the reason for this action.

2-6 SAFETY ADVISORY

Issue a safety advisory to an aircraft if you are aware the aircraft is at an altitude which, in your judgment, places it in unsafe proximity to terrain, obstructions, or other aircraft. Once the pilot informs you action is being taken to resolve the situation, you may discontinue the issuance of further advisories. Do not assume that because someone else has responsibility for the aircraft that the unsafe situation has been observed and the safety advisory issued; inform the appropriate controller.

2-6 Note 1. — The issuance of a safety advisory is a first priority (see paragraph 2-2) once the controller observes and recognizes a situation of unsafe aircraft proximity to terrain, obstacles, or other aircraft. Conditions such as workload, traffic volume, the quality/limitations of the radar system, and the available lead time to react are factors in determining whether it is reasonable for the controller to observe and recognize such situations. While a controller cannot see immediately the development of every situation where a safety advisory must be issued, the controller must remain constantly alert for such situations and issue a safety advisory when the situation is recognized.

2-6 Note 2. — Recognition of situations of unsafe proximity may result from MSAW/E-MSAW/LAAS, automatic altitude readouts, Conflict Alert, observations on a PAR scope, or pilot reports.

2-6 Note 3. — Once the advisory is issued, it is solely the pilot's prerogative to determine what course of action, if any, he will take.

a. Terrain/obstruction advisory — Immediately issue/initiate an advisory to an aircraft if you are aware the aircraft is at an altitude which, in your judgment, places it in unsafe proximity to terrain/obstructions. Issue the advisory as follows:

Phraseology:

(Identification) LOW ALTITUDE ALERT,
CHECK YOUR ALTITUDE IMMEDIATELY.
THE, *as appropriate,* MEA/MVA/MOCA/MIA
IN YOUR AREA IS (altitude),
or if past the final approach fix,
THE, *as appropriate,* MDA/DH (if known)
IS (altitude).

2-16a References. — Order 7210.3 — 430, Letters of Agreement. FAR 91.85, Operating on or in the Vicinity of an Airport. Glossary (Airport Traffic Area).

b. Coordinate with the appropriate control tower for transit authorization when you are providing radar traffic advisory service to an aircraft that will enter another facility's airport traffic area.

2-16b Note. — The pilot is not expected to obtain his own authorization through each area when in contact with a radar facility.

c. Transfer communications to the appropriate facility, if required, prior to operation within the airport traffic area.

2-16c References. — Radio Communications Transfer, 2-17. FAR 91.87, Operation at Airports with Operating Control Towers.

2-17 RADIO COMMUNICATIONS TRANSFER

a. Transfer radio communications before an aircraft enters the receiving controller's area of jurisdiction unless otherwise coordinated.

b. Transfer radio communications by specifying the following:

2-17b Note. — Radio communications transfer procedures may be specified by letter of agreement or contained in the route description of an MTR and as published in the DOD Planning AP/1B (AP/3).

(1) The facility name or location name and terminal function to be contacted. *TERMINAL:* Omit the location name when transferring communications to another controller within your facility except as required in 5-137.

(2) Frequency to use except the following may be omitted:

(a) FSS frequency.

(b) Departure frequency if previously given or published on a SID chart for the procedure issued.

(c) *TERMINAL:*

(i) Ground or local control frequency if in your opinion the pilot knows which frequency is in use.

(ii) The numbers preceding the decimal point if the ground control frequency is in the 121 MHz bandwidth.

2-17b Examples. —

"Contact tower."

"Contact ground."

"Contact ground point seven."

"Contact ground, one two zero point eight."

"Contact Huntington Radio."

"Contact departure."

"Contact Los Angeles Center, one two three point four."

(3) Time, fix, altitude, or specifically when to contact a facility. You may omit this when compliance is expected upon receipt.

2-17b(3) Note. — The AIM, paragraph 340, informs pilots that they are expected to maintain a listening watch on the transferring controller's frequency until the time, fix, or altitude specified.

Phraseology:

CONTACT (facility name or location name and terminal function), (frequency).

If required,

AT (time, fix, or altitude).

c. Avoid issuing a frequency change to helicopters known to be single piloted during air-taxiing, hovering, or low-level flight. Whenever possible, relay necessary control instructions until the pilot is able to change frequency.

2-17c Note. — Most light helicopters are flown by one pilot and require the constant use of both hands and feet to maintain control. Although flight control friction devices assist the pilot, changing frequency near the ground could result in inadvertent ground contact and consequent loss of control. Pilots are expected to advise ATC of their single pilot status if unable to comply with a frequency change.

2-17c. Reference. — AIM.

d. In situations where the controller does not want the pilot to change frequency but the pilot is expecting or may want a frequency change, use the following phraseology.

Phraseology:

REMAIN THIS FREQUENCY.

2-18 OPERATIONAL REQUESTS

Approve or disapprove a pilot's or vehicle operator's request as circumstances permit. In cases where specific phraseology is not set forth for the applicable procedure, use the following phraseology to approve or disapprove these requests.

Phraseology:

APPROVED AS REQUESTED.

(Requested operation) APPROVED.

UNABLE (requested operation).

When necessary,

(reason and/or additional instructions.)

2-19 WAKE TURBULENCE

a. Apply wake turbulence procedures to aircraft operating behind heavy jets and, where indicated, to small aircraft behind large aircraft.

2-19a Note.— Paragraph 5-72e specifies increased radar separation for small type aircraft landing behind large or heavy aircraft because of the possible effects of wake turbulence.

b. The separation minima shall continue to touchdown for all IFR aircraft not making a visual approach or maintaining visual separation.

c. *USAF:* Separate aircraft other than heavy jets operating behind an A-300, B-747, C-5A, DC-10, or L-1011 — *10 miles or 4 minutes.*

2-20 WAKE TURBULENCE CAUTIONARY ADVISORIES

a. Issue wake turbulence cautionary advisories and the position, altitude if known, and direction of flight of the heavy jets to:

2-20a. Reference. — AC 90-23D, Pilot Responsibility, paragraph 12.

(1) *TERMINAL:* VFR aircraft not being radar vectored but are behind heavy jets.

Arriving Aircraft

2-20a(1) Illustration

(2) IFR aircraft that accept a visual approach or visual separation.

2-20a(2) Reference. — Visual Approach, 7-30.

(3) *TERMINAL:* VFR arriving aircraft that have previously been radar vectored and the vectoring has been discontinued.

b. Issue cautionary information to any aircraft if in your opinion wake turbulence may have an adverse effect on it. When traffic is known to be a heavy aircraft, include the word *heavy* in the description.

2-20b Note. — Wake turbulence may be encountered by aircraft in flight as well as when operating on the airport movement area. Because wake turbulence is unpredictable, the controller is not responsible for anticipating its existence or effect.

2-20b Reference. — Advisory Circular 90-23D. Glossary (Aircraft Classes and Wake Turbulence).

Phraseology:

CAUTION WAKE TURBULENCE (traffic information).

2-21 TRAFFIC ADVISORIES

Unless an aircraft is operating within the Positive Controlled Area or omission is requested by the pilot, issue traffic advisories to all aircraft (IFR or VFR) on your frequency when in your judgment their proximity may diminish to less than the applicable separation minima. Provide this service as follows:

a. To radar identified aircraft:

(1) Azimuth from aircraft in terms of the 12-hour clock, or

(2) When rapidly maneuvering civil test or military aircraft prevent accurate issuance of traffic as in (1) above, specify the direction from an aircraft's position in terms of the eight cardinal compass points(N, NE, E, SE, S, SW, W, and NW). This method shall be terminated at the pilot's request.

(3) Distance from aircraft in miles.

(4) Direction in which traffic is proceeding and/or relative movement of traffic.

2-21a(4) Note. — Relative movement includes closing, converging, parallel same direction, opposite direction, diverging, overtaking, crossing left to right, crossing right to left.

(5) If known, type of aircraft and altitude.

2-21a(5) Reference. — Description of Aircraft Types, 2-88.

(6) If Mode C altitude readout is not verified, state the word "unverified" after the altitude.

2-21a(6) Note. — In a radar environment, altitude information will be ascertained by either a report or verified Mode C. Altitude readout which is unverified may still be helpful provided the pilot knows it is not verified.

Phraseology:

TRAFFIC, (number) O'CLOCK *or, when appropriate,* (direction, (number) MILES, (direction)-BOUND *and/or* (relative movement), *and if known,* (type of aircraft and altitude).

If altitude is unknown,

ALTITUDE UNKNOWN.

If altitude is unverified Mode C,

(altitude) UNVERIFIED.

2-21a Examples. —

"Traffic, eleven o'clock, one zero miles, southbound, converging, DC-8, one seven thousand."

"Traffic, twelve o'clock, one five miles, opposite direction, altitude unknown."

"Traffic, two o'clock, one zero miles, westbound, six thousand five hundred unverified."

"Traffic, northeast, five miles, southbound, one five thousand five hundred unverified."

"Traffic, numerous targets, vicinity of Delia Airport."

(7) When requested by the pilot, issue radar vectors to assist in avoiding the traffic, provided the aircraft to be vectored is within your area of jurisdiction or coordination has been effected with the sector/facility in whose area the aircraft is operating.

(8) If unable to provide vector service, inform the pilot.

2-21a(8) Reference. — Operational Requests, 2-18.

(9) If the pilot informs you he does not see the traffic you have issued, inform him when the traffic is no longer a factor.

Phraseology:

TRAFFIC NO LONGER A FACTOR,

or

(number) O'CLOCK TRAFFIC NO LONGER A FACTOR,

or

(direction) TRAFFIC NO LONGER A FACTOR.

b. To aircraft that are not radar identified:

(1) Distance and direction from fix.

(2) Direction in which traffic is proceeding.

(3) If known, type of aircraft and altitude.

(4) ETA over the fix the aircraft is approaching, if appropriate.

Phraseology:

TRAFFIC, (number) MILES/MINUTES (direction) OF (airport or fix), (direction)-BOUND, *and if known,* (type of aircraft and altitude), ESTIMATED (fix) (time),

or

TRAFFIC, NUMEROUS TARGETS VICINITY (location).

If altitude is unknown,

ALTITUDE UNKNOWN.

2-21b Examples. —

"Traffic, one zero miles east of Forsythe V-O-R, southbound, DC-8, descending to one six thousand."

"Traffic, reported one zero miles west of Downey V-O-R, northbound, Apache, altitude unknown, estimated Joliet V-O-R one three one five."

"Traffic, eight minutes west of Chicago Heights V-O-R, westbound, Mooney, eight thousand, estimated Joliet V-O-R two zero three five."

2-22 BIRD ACTIVITY INFORMATION

a. Issue advisory information on pilot-reported, tower-observed, or radar-observed and pilot-verified bird activity. Include position, species or size of birds, if known, course of flight, and altitude. Do this for at least 15 minutes after receipt of such information from pilots or from adjacent facilities unless visual observation or subsequent reports reveal the activity is no longer a factor.

Phraseology:

FLOCK OF (species, if known) (size, if known) BIRDS, (number) O'CLOCK (number) MILES (direction)-BOUND, LAST REPORTED AT (altitude, as determined from pilot report),

or

ALTITUDE UNKNOWN.

FLOCK OF (species, if known) (size, if known) BIRDS (direction)-BOUND ALONG (flyway or geographical route), LAST REPORTED AT (altitude, as determined from pilot report),

or

ALTITUDE UNKNOWN.

FLOCK OF/NUMEROUS FLOCKS (species, if known)/(size, if known) BIRDS, VICINITY (location), LAST REPORTED AT (altitude, as determined from pilot report),

or

ALTITUDE UNKNOWN.

2-22a. Examples. —

"Flock of geese, one o'clock, seven miles, northbound, last reported at four thousand."

"Flock of small birds, southbound along Mohawk River, last reported at three thousand."

"Numerous flocks of ducks, vicinity Lake Winnebago, altitude unknown."

b. Relay bird activity information to adjacent facilities and to FSS's whenever it appears it will become a factor in their areas.

2-23 TRANSFER OF POSITION RESPONSIBILITY

The transfer of position responsibility shall be accomplished in accordance with the "Standard Operating Practice (SOP) for the Transfer of Position Responsibility," and the appropriate facility directives each time the operational responsibility for a position is transferred from one specialist to another.

2-24 thru 2-29 RESERVED

Section 2. FLIGHT PLANS AND CONTROL INFORMATION

2-30 RECORDING INFORMATION

a. Record domestic flight plans on flight plan forms or flight progress strips. Enter information required by the type of flight plan, existing circumstances, and future communications since all items are not necessary in each instance and not all entered will be transmitted when the flight plan is processed. Use authorized abbreviations when possible. When accepting flight plans for random RNAV routes, ensure that the route is defined by waypoints in terms of degree-distance fixes.

2-30a Note. — Generally, all military overseas flights are required to clear through a specified military base operations office (BASOPS). Pilots normally will not file flight plans directly with an FAA facility unless a BASOPS is not available. BASOPS will, in turn, forward the IFR flight notification message to the appropriate center.

b. When accepting flight plans for random routes that are defined by latitude/longitude coordinates, ensure that the route is identified by waypoints in terms of latitude/longitude fixes and departure/arrival fix identifiers. Latitude/longitude coordinates shall be recorded in degrees and minutes as follows: four figures describing latitude in degrees and minutes, followed by a solidus (/), and five figures describing longitude in degrees and minutes.

2-30b Example. —

"3559/11451"

c. *EN ROUTE:* When flight plans are filed directly with the center, record all items given by the pilot either on a flight progress strip or on a voice recorder. If the latter, enter in box 26 of the initial flight progress strip the sector or position number to identify where the information may be found in the event SAR activities become necessary.

2-31 FORWARDING INFORMATION

a. Except during Stage A operation, forward the flight plan information to the appropriate ATC facility, FSS, or BASOPS and record the time of filing and delivery on the form.

b. *EN ROUTE:* During Stage A operations, the above manual actions are required in cases where the data is not forwarded automatically by the computer.

2-31b Note.— During Stage A operation, data are exchanged between interfaced automated facilities and both the data and time of transmission are recorded automatically.

c. *EN ROUTE:* Forward proposed tower en route flight plans and any related amendments to the appropriate departure terminal facility.

2-32 FORWARDING VFR DATA

TERMINAL

Forward aircraft departure times to FSS's or military operations offices when they have requested them. Forward other VFR flight plan data only if requested by the pilot.

2-33 MILITARY DVFR DEPARTURES

TERMINAL

Forward departure times on all military DVFR departures from joint-use airports to the military operations office.

2-33 Note 1. — Details for handling air carrier, nonscheduled civil, and military DVFR flight data are contained in 7610.4.

2-33 Note 2. — Military pilots departing DVFR from a joint-use airport will include the phrase "DVFR to (destination)" in their initial call-up to an FAA operated tower.

2-34 IFR TO VFR FLIGHT PLAN CHANGE

Request a pilot to contact the appropriate FSS if he informs you of a desire to change from an IFR to a VFR flight plan.

2-35 IFR FLIGHT PROGRESS DATA

Forward control information from controller to controller within a facility, then to the receiving facility as the aircraft progresses along its route. Where appropriate, use computer equipment in lieu of manual coordination procedures. Ensure that flight plan and control information is correct and up-to-date. When covered by a letter of agreement/facility directive, the time requirements of a. may be reduced, and the time requirements of b(1) and 2-41a. may be increased up to 15 minutes when facilitated by automated systems or mandatory radar handoffs; or if operationally necessary because of manual data processing or nonradar operations, the time requirements of a. may be increased.

2-35 Note 1. — The procedures for preparing flight plan and control information related to altitude reservations (ALTRV's) are contained in Order 7210.3 — 1001. Development of the methods of assuring the accuracy and completeness of ALTRV flight plan and control information is the responsibility of the Military Liaison and Security Officer.

2-35 Note 2. — The term facility in this paragraph is defined as centers and terminal facilities when operating in an en route capacity.

a. Forward the following information at least 15 minutes before the aircraft is estimated to enter the receiving facility's area:

(1) Aircraft identification.

(2) Heavy aircraft indicator "H" (if appropriate), type of aircraft and appropriate suffix if transponder, DME, RNAV, or TACAN-only equipped.

(3) Assigned altitude and ETA over last reporting point/fix in transferring facility's area or assumed departure time when the departure point is the last point/fix in the transferring facility's area.

(4) Altitude at which aircraft will enter the receiving facility's area if other than the assigned altitude.

(5) True airspeed.

(6) Point of departure.

(7) Route of flight remaining.

(8) Destination airport and clearance limit if other than destination airport.

(9) ETA at destination airport (not required for military or scheduled air carrier aircraft).

(10) Altitude requested by the aircraft if assigned altitude differs from requested altitude (within a facility only).

2-35a(10) Note. — When an aircraft has crossed one facility's area and assignment at a different altitude is still desired, the pilot will reinitiate his request with the next facility.

2-35a(10) Reference. — Anticipated Altitude Changes, 4-46.

(11) When flight plan data must be forwarded manually and an aircraft has been assigned a beacon code by the computer, include the code as part of the flight plan.

(12) Longitudinal separation being used between aircraft at the same altitude if it results in these aircraft having less than 10 minutes separation at the facilities' boundary.

(13) Any additional non-routine operational information pertinent to flight safety.

2-35(13) Note. — *EN ROUTE:* This includes alerting the receiving controller that the flight is conducting celestial navigation training.

2-35a(13) Reference. — *EN ROUTE:* Celestial Navigation Training, 8-21.

b. Forward position report over last reporting point in the transferring facility's area if any of the following conditions exist:

(1) Time differs more than 3 minutes from estimate given.

(2) Requested by receiving facility.

(3) Agreed to between facilities.

2-36 MANUAL INPUT OF COMPUTER ASSIGNED BEACON CODES

When a flight plan is manually entered into the computer and a computer-assigned beacon code has been forwarded with the flight plan data, insert the beacon code in the appropriate field as part of the input message.

2-37 ALTRV INFORMATION

EN ROUTE

When an aircraft is a part of an approved ALTRV, forward only those items necessary to properly identify the flight, update flight data contained in the ALTRV APVL, or revise previously given information.

2-38 COMPUTER MESSAGE VERIFICATION

EN ROUTE

Unless your facility is equipped to automatically obtain acknowledgment of receipt of transferred data, when you transfer control information by computer message obtain, via Service F, acknowledgment that the receiving center has received the message and verification of the following:

a. Within the time limits specified by a letter of agreement or when not covered by a letter of agreement, at least 15 minutes before the aircraft is estimated to enter the receiving facility's area or at the time of a radar handoff or coordination for transfer of control:

(1) Aircraft identification.

(2) Assigned altitude.

(3) Departure or coordination fix time.

b. Any cancellation of IFR flight plan.

2-39 TRANSMIT PROPOSED FLIGHT PLAN

EN ROUTE

a. Transmit proposed flight plans which fall within an ARTCC's Proposed Boundary Crossing Time (PBCT) parameter to adjacent ARTCC's via the Computer B network during hours of inter-center computer operation. In addition, when the route of flight of any proposed flight plan exceeds 20 elements external to the originating ARTCC's area, Center B shall be used to forward the data to all affected centers.

b. During nonautomated operation, the proposed flight plans shall be sent via Center B to the other centers involved when any of the following conditions are met:

(1) The route of flight external to the originating center's area consists of 10 or more elements and the flight will enter 3 or more other center areas.

2-39b(1) Note. — An element is defined as either a fix or route as specified in Order 7110.80-156.

(2) The route of flight beyond the first exit from the originating center's area consists of 10 or more elements, which are primarily fixes described in fix-radial-distance or latitude/longitude format, regardless of the number of other center areas entered.

(3) The flight plan remarks are too lengthy for interphone transmission.

2-40 FORWARDING AMENDED AND UTM DATA

a. Forward any amending data concerning previously forwarded flight plans except that revisions to ETA information in 2-35a(3). need only be forwarded when the time differs by more than 3 minutes from the estimate given.

Phraseology:

(Identification), REVISED (revised information).

2-40a. Examples. —

"American Two, revised flight level, three three zero."

"United Eight Ten, revised estimate, Front Royal two zero zero five."

"Douglas Five Zero One Romeo, revised altitude, eight thousand."

"Eastern Four Thirty-six, revised type, heavy DC-8."

b. Computer acceptance of an appropriate input message fulfills the requirement for sending amended data. The amendment data are considered acknowledged upon receipt of a CRD update message or a computer-generated flight progress strip containing the amendment data.

2-40b. Note 1. — The successful utilization of automation equipment requires timely and accurate insertion of changes and/or new data.

2-40b. Note 2. — If a pilot is not issued a computer generated PDR/PDAR/PAR and amendment data are not entered into the computer, the next controller will have incorrect route information.

c. Forward any amending control information and record the action on the appropriate flight progress strip.

d. *EN ROUTE:* During Stage A operation, effect manual coordination on an initial interfacility flight plan message and on any subsequent messages related to that flight plan under the following conditions:

(1) When a red coordination indicator is printed on the coordination strip.

(2) When a black coordination indicator is printed on the coordination strip and an Unsuccessful Transmission Message (UTM) referencing that flight plan is received at the coordination sector. Draw a line through the computer coordination indicator and indicate when manual coordination has been effected.

(3) When the transmission of the initial flight plan message is successful and a UTM is received containing revised data.

2-41 AIRBORNE MILITARY FLIGHTS

Forward to FSS's the following information received from airborne military aircraft:

a. IFR flight plans.

b. Changes to an IFR flight plan as follows:

(1) Change in destination

(2) Revised ETA.

(3) Change in fuel exhaustion time.

2-41 Note. — This makes current information available to FSS's for relay to military bases concerned and for use by centers in the event of two-way radio communication failure.

2-42 FORWARDING FLIGHT PLAN DATA BETWEEN U.S. ARTCC'S AND CANADIAN ACC'S

EN ROUTE

a. *Domestic—* (Continental U.S./Canadian Airspace except Alaska) Proposed departure flight plans and en route estimates will be handled on a 30 minute lead time (or as bilaterally agreed) between any ACC or ARTCC.

b. *International—* Any route changes (except SID's) must be forwarded to the appropriate Oceanic/Pre-oceanic ACC or ARTCC with an optimum lead time of 30 minutes or as soon as this information becomes available.

c. Intially, if a flight goes from U.S. airspace into Canadian airspace and returns to U.S. airspace, the ACC will be responsible for forwarding the flight plan data to the appropriate ARTCC by voice transmission except for flights which traverse mutually agreed on airways/fixes. These airways/fixes will be determined on a case-by-case basis and will be based on time and distance considerations at the regional level.

2-43 TELETYPE FLIGHT DATA FORMAT — U.S. ARTCC's — CANADIAN ACC's

EN ROUTE

The exchange of flight plan data between Canadian ACC's and U.S. ARTCC's shall be made as follows:

a. The U.S. ARTCC will transmit flight data to the Canadian ACC's in one of the following formats:

(1) FAA Service B Teletypewriter input format as described in the NAS Management Directives (MD's) for:

(a) Flight Plan Messages:

(i) Active

(ii) Proposed.

(b) Amendment Messages.

(c) Cancellation Messages.

(d) Response Messages to Canadian Input:

(i) Acknowledgment Messages.

(ii) Error Messages.

(iii) Rejection Messages.

(2) Canadian Ministry of Transport, ACC Flight Strip Format: Where the data to be printed on the ACC strip form exceeds the strip form field size, the FAA Service B Teletypewriter input format in (1) above will be used. Input sequentially fields (1) through (8).

b. The Ministry of Transport ACC's will transmit flight data to the FAA ARTCC's in the following format:

(1) FAA Service B Teletypewriter input format as described in NAS MD's for:

(a) Flight Plan Messages:

(i) Active.

(ii) Proposed.

(b) Amendment Messages.

(c) Cancellation Messages.

(d) Correction Messages.

2-44 thru 2-49 RESERVED

Section 3. FLIGHT PROGRESS STRIPS

2-50 GENERAL

Use flight progress strips to post current data on air traffic and clearances required for control and other air traffic control services. To prevent misinterpretation when data is hand printed use standard hand-printed characters.

2-50 Note. — Unused flight progress strips, made available because of the design of strip printers whereby several blank strips are ejected to reach the first printed strip, should be saved and used for manual strip preparation.

a. Enter on the appropriate strip without delay the estimated times, clearance information, position reports, and any other IFR flight data received over any communications channel.

b. Maintain only necessary current data and remove the strips from the flight progress boards when no longer required for control purposes. To correct, update, or preplan information:

(1) Do not erase or overwrite any item. Use an "X" to delete a climb/descend and maintain arrow, an at or above/below symbol, a cruise symbol, and unwanted altitude information. Write the new altitude information immediately adjacent to it and within the same space. For other items, draw a horizontal line through it, and write the new item immediately adjacent to it and within the same space.

(2) Do not draw a horizontal line through an altitude being vacated until after the aircraft has reported or is observed (valid Mode C) leaving the altitude.

(3) *EN ROUTE:* Preplanning may be accomplished in red pencil.

c. Enter the time of arrival (at approach control locations, the time over release point) for aircraft landing within your sector jurisdiction as follows:

(1) *EN ROUTE:* Within controlled airspace — On the appropriate fix strip.

(2) *EN ROUTE:* Outside of controlled airspace but within flight advisory area — On the strip of the fix nearest the point of landing.

d. Manually prepared strips shall conform to the format of machine-generated strips and manual strip preparation procedures will be modified simultaneously with the operational implementation of changes in the machine-generated format.

STANDARD RECORDING OF HAND-PRINTED CHARACTERS

Typed	Hand Printed	Typed	Hand Printed	Typed	Hand Printed	Typed	Hand Printed
A	A	J	J	S	S	1	1
B	B	K	K	T	T	2	2
C	C	L	L	U	U	3	3
D	D	M	M	V	V	4	4
E	E	N	N	W	W	5	5
F	F	O	O	X	X	6	6
G	G	P	P	Y	Y	7	7
H	H	Q	Q	Z	Z	8	8
I	I	R	R			9	9
						*0	0

* The slant line cross through the numeral zero and the underline of the letter "S" on handwritten portion of the flight progress strips are required only when there is reason to believe the lack of these markings could lead to a misunderstanding. The slant line cross through the numeral zero is required on weather data.

2-50 Illustration

2-51 ARRANGEMENT OF POSTINGS

EN ROUTE

Arrange flight progress strips under the appropriate fix designators in the following manner:

a. Post in the appropriate low or high altitude sector according to the assigned altitude or flight level.

b. Sequence in chronological order of arrival over a particular fix (time sequencing) or in ascending order of assigned altitudes over a holding fix (altitude sequencing).

c. Post arrival aircraft in time sequence below the departure aircraft when displayed under the same fix designator, or sequence arrivals and departures together if considered more appropriate for a given fix. Arrival aircraft and departure aircraft may be displayed in two different bays.

2-52 DATA ENTRIES

EN ROUTE

a. Enter the information specified below in the correspondingly numbered spaces of the flight progress strips (FAA Form 7230-19):

(1) Verification symbol, if required.

(2) Revision number.

(3) Aircraft identification.

(4) Number of aircraft (if more than one), heavy aircraft indicator "H/" (if appropriate), type of aircraft, and special equipment indicators.

(5) Filed true airspeed.

(6) Sector number.

(7) Computer identification number, if required.

(8) Estimated groundspeed.

(9) Revised groundspeed or strip request (SR) originator.

(10) Strip number.

(11) Previous fix.

(12) Estimated time over previous fix.

(13) Revised estimated time over previous fix.

(14) Actual time over previous fix or actual departure time entered on first fix posting after departure.

(14a) Plus time expressed in minutes from the previous fix to the posted fix.

(15) Center - estimated time over fix (in hours and minutes) or clearance information for departing aircraft.

(16) Arrows to indicate if aircraft is departing (↑) or arriving (↓).

(17) Pilot - estimated time over fix.

(18) Actual time over fix, time leaving holding fix, arrival time at nonapproach control airport, or symbol indicating cancellation of IFR flight plan for arriving aircraft, or departure time (actual or assumed).

(19) Fix. For departing aircraft, add proposed departure time.

(20) Altitude (in hundreds of feet) information.

(21) Next posted fix or coordination fix.

(22) Pilot's estimated time over next fix.

(23) Arrows to indicate north (↑), south (↓), east (→), or west (←) direction of flight, if required.

(24) Requested altitude.

(25) Point of origin, route as required for control and data relay, and destination.

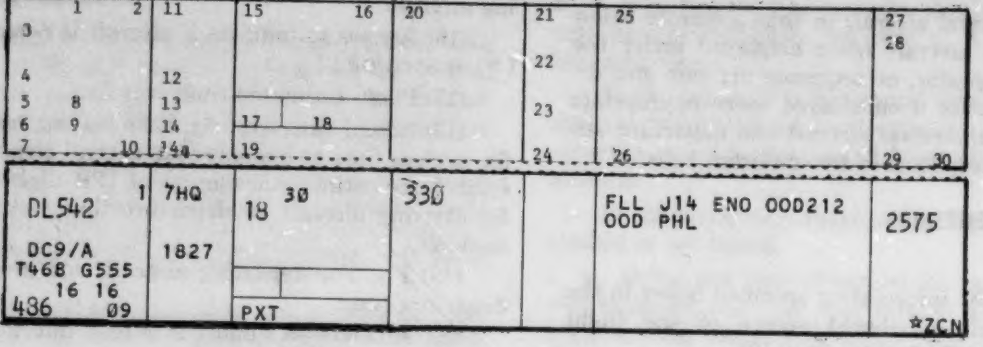
(26) Pertinent remarks, point out/radar vector/speed adjustment information or sector/position number (when applicable in accordance with 2-30c.). Facility chiefs may authorize the optional use of spaces 13, 14, 14a, 22, 23, 24, or 28 for point out/radar vector or speed adjustment information.

(27) Mode 3/A beacon code (if applicable).

(28) Miscellaneous control data (expected further clearance time, time cleared for approach, etc.).

(29-30) Transfer of control data and coordination indicators.

b. Latitude/longitude coordinates may be used to define waypoints and may be substituted for nonadapted NAVAID's in space (25) of domestic en route flight progress strips provided it is necessary to accomodate a random RNAV route request.



2-52 Illustration

2-53 DATA ENTRIES

TERMINAL

Enter the information specified below in the correspondingly numbered spaces of the flight progress strips (FAA Forms 7230-7.1, 7230-7.2, and 7230-8):

2-53 Note 1. — National standardization of items (10 through 18) is not practical because of regional and local variations in operating methods; e.g., single fix, multiple fix, radar, tower en route control, etc.

2-53 Note 2. — Air traffic managers at FDEP locations may authorize reduced lateral spacing between fields so as to print all FDEP data to the left of the strip perforation when using FAA Form 7230-7.2. All items will retain the same relationship to each other as they do when the full length strip (FAA Form 7230-7.1) is used.

a. Arrivals:

(1) Aircraft identification.

(2) Revision number (FDEP locations only).

(2A) Strip request originator. (At FDEP locations this indicates the sector or position that requested a strip be printed.)

(3) Number of aircraft (if more than one), heavy aircraft indicator "H/" (if appropriate), type of aircraft, and suffix indicating any special equipment.

(4) Computer identification number, if required.

(5) Secondary radar (beacon) code assigned.

(6) Previous fix (FDEP locations) or inbound airway.

2-53a(6) Note. — The previous fix will be printed at FDEP locations. Use of the inbound airway is restricted to facilities where flight data is received via interphone when agreed upon by the center and terminal facilities.

(7) Coordination fix.

(8) Estimated time of arrival at the coordination fix or destination airport.

(9) Altitude (in hundreds of feet) and remarks.

(9A) Destination airport/point out/radar vector/speed adjustment information. Air traffic managers may authorize the omission of any of these items if no misunderstanding will result, and they may authorize the optional use of spaces 2A and 10-18 for point out/radar vector or speed adjustment information.

2-53a(9A) Note. — Air traffic managers may permit this information to be omitted if no misunderstanding will result. This shall be specified in the facility directive concerning strip marking procedures.

(10 through 18) Enter data as specified by a facility directive. Radar facility personnel need not enter data in these spaces except when nonradar procedures are used or when radio recording equipment is inoperative.

b. Departures:

(1) Aircraft identification.

(2) Revision number (FDEP locations only).

(2A) Strip request originator. (At FDEP locations this indicates the sector or position that requested a strip be printed.)

(3) Number of aircraft (if more than one), heavy aircraft indicator "H/" (if appropriate), type of aircraft, and suffix indicating any special equipment.

(4) Computer identification number, if required.

(5) Secondary radar (beacon) code assigned.

(6) Proposed departure time.

(7) Requested altitude.

(8) Departure airport.

2-53b(6, 7, and 8) Reference. — See 2-53a(9A) Note.

(9) Machine generated — Route, destination, and remarks. Manually enter altitude/altitude restrictions in the order flown, if appropriate.

Manually prepared — Clearance limit, route, altitude/altitude restrictions in the order flown, if appropriate, and remarks.

(9A) Point out/radar vector/speed adjustment information. Air traffic managers may authorize the optional use of spaces 2A and 10-18 for this information.

(10 through 18) Enter data as specified by a facility directive. Items, such as departure time, runway used for takeoff, check marks to indicate information forwarded or relayed, may be entered in these spaces.

c. Overflights:

(1) Aircraft identification.

(2) Revision number (FDEP locations only).

(2A) Strip request originator. (At FDEP locations this indicates the sector or position that requested a strip be printed.)

(3) Number of aircraft (if more than one), heavy aircraft indicator "H/" (if appropriate), type of aircraft, and suffix indicating any special equipment.

(4) Computer identification number, if required.

(5) Secondary radar (beacon) code assigned.

(6) Coordination fix.

(7) Overflight coordination indicator (FDEP locations only).

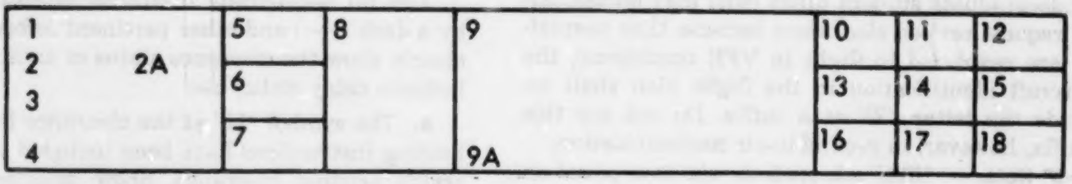
2-53c(7) Note. — The overflight coordination indicator identifies the facility to which flight data has been forwarded.

(8) Estimated time of arrival at the coordination fix.

(9) Altitude and route of flight through the terminal area.

(9A) Point out/radar vector/speed adjustment information. Air traffic managers may authorize the optional use of spaces 2A and 10-18 for this information.

(10 through 18) Enter data as specified by a facility directive.



2-53 Illustration

2-54 AIRCRAFT IDENTITY

Indicate aircraft identity by one of the following using combinations not to exceed seven alphanumeric characters:

a. Civil aircraft, including air carrier — Aircraft letter — digit registration number including the letter "T" prefix for air taxi aircraft, the letter "L" for lifeguard aircraft, or the 2- or 3- letter aircraft company designator specified in the Contractions Handbook, followed by the trip or flight number. Use the operating air carrier's company name in identifying equipment interchange flights.

2-54a Examples. —

"N12345." "TN5552Q." "AA192." "LN751B."

b. Military —

(1) Prefixes indicating branch of service and/or type of mission followed by the last 5 digits of the serial number (last 4 digits for CAF/CAM/CTG).

2-54b(1) Table. — Branch of Service Prefix

Prefix	*Branch*
A	U.S. Air Force
C	U.S. Coast Guard
G	Air or Army National Guard
VM	U.S. Marine Corps
R	U.S. Army
VV	U. S. Navy
CAF	Canadian Armed Force
CAM	Canadian Armed Force (Transport Command)
CTG	Canadian Coast Guard

2-54b(1) Table. — Military Mission Prefix

Prefix	*Mission*
E	Medical Air Evacuation
L	LOGAIR (USAF Contract)
S	Special Air Mission
M	MAC (Military Airlift Command)
F	Flight Check

(2) Pronounceable words of 3, 4, 5, and 6 letters followed by a 4-, 3-, 2-, or 1-digit number.

2-54b(2) Example. —
"SAMP 316."

(3) Assigned double-letter 2-digit flight number.

(4) Navy or Marine fleet and training command aircraft, one of the following:

(a) The service prefix and 2 letters (use phonetic alphabet equivalent), followed by 2 or 3 digits.

(b) The service prefix and a digit and a letter (use phonetic alphabet equivalent) followed by 2 or 3 digits.

c. Special-use — Approved special-use identifiers.

2-55 AIRCRAFT TYPE

Use the approved codes listed in the Contractions Handbook to indicate aircraft type.

2-56 USAF/USN UNDERGRADUATE PILOTS

To identify aircraft piloted by solo USAF/USN undergraduate student pilots (who may occasionally request revised clearances because they normally are restricted to flight in VFR conditions), the aircraft identification in the flight plan shall include the letter "Z" as a suffix. Do not use this suffix, however, in ground-to-air communication.

2-56 Note. — USAF solo students who have passed an instrument certification check may penetrate cloud layers in climb or descent only. Requests for revised clearances to avoid clouds in level flight can still be expected. This does not change the requirement to use the letter "Z" as a suffix to the aircraft identification.

2-56 Reference. — Order 7610.4, Part 11, Chapter 34.

2-57 AIRCRAFT EQUIPMENT SUFFIX

a. Indicate, for both VFR and IFR operations, the aircraft's radar transponder, DME, or RNAV capability by adding the appropriate symbol, preceded by a slant as follows:

/X	No Transponder.
/T	Transponder with no altitude encoding capability.
/U	Transponder with altitude encoding capability.
/D	DME, no transponder.
/B	DME, transponder with no altitude encoding capability.
/A	DME, transponder with altitude encoding capability
/M	TACAN-only, no transponder.
/N	TACAN-only, transponder with no altitude capability.
/P	TACAN-only, transponder with altitude encoding capability.
/C	RNAV, transponder with no altitude encoding capability.
/R	RNAV, transponder with altitude encoding capability.
/W	RNAV and no transponder.

b. When forwarding this information, state the aircraft type followed by the word "slant" and the appropriate phonetic letter equivalent of the suffix.

2-57 Examples. —
"D-C six slant tango."
"F-four-C slant november."
"F-eight-E slant papa."
"Seven-oh-seven slant romeo."

2-58 CLEARANCE STATUS

Use an appropriate clearance symbol followed by a dash (—) and other pertinent information to clearly show the clearance status of an aircraft. To indicate delay status use:

a. The symbol "H" at the clearance limit when holding instructions have been included in the aircraft's original clearance. Show detailed holding information following the dash when holding differs from the established pattern for the fix; i.e., turns, leg lengths, etc.

b. The symbols "F" or "O" to indicate the clearance limit when a delay is not anticipated.

2-59 CONTROL SYMBOLOGY

Use authorized control and clearance symbols or abbreviations for recording clearances, reports, and instructions. Control status of aircraft must always be current. You may use:

a. Plain language markings when it will aid in understanding information.

b. Locally approved identifiers. Use these only within your facility and not on teletypewriter or interphone circuits.

c. Plain sheets of paper to record information when flight progress strips are not used.

2-59 Table 1. — Clearance Abbreviations

Abbreviation	Meaning
A	Cleared to airport (point of intended landing)
B	Center clearance delivered
C	ATC clears (when clearance relayed through non-ATC facility)
CAF	Cleared as filed
D	Cleared to depart from the fix
F	Cleared to the fix
H	Cleared to hold and instructions issued
L	Cleared to land
N	Clearance not delivered
O	Cleared to the outer marker
PD	Cleared to climb/descend at pilot's discretion
Q	Cleared to fly specified sectors of a NAVAID defined in terms of courses, bearings, radials or quadrants within a designated radius.
T	Cleared through (for landing and takeoff through intermediate point)
V	Cleared over the fix
X	Cleared to cross (airway, route, radial) at (point)
Z	Tower jurisdiction

2-59 Table 2. — Miscellaneous Abbreviations

Abbreviation	Meaning
BC	Back course approach
CT	Contact approach
I	Initial approach
FA	Final approach
MA	Missed approach
NDB	Nondirectional radio beacon approach
SI	Straight-in approach
TA	TACAN approach
TL	Turn left
TR	Turn right
VA	Visual approach
VR	VOR approach
ILS	ILS approach
OTP	VFR conditions-on-top
PT	Procedure turn
RX	Report crossing
RP	Report immediately upon passing (fix/altitude)
SA	Surveillance approach
PA	Precision approach
RH	Runway Heading

2-59 Table 3. Control Information Symbols

Symbol	*Meaning*
T→( )	Depart (direction, if specified)
↑	Climb and maintain
↓	Descend and maintain
→	Cruise
@	At
X	Cross
M→	Maintain
ㅋ	Join or intercept airway/jet route/ track or course
=	While in controlled airspace
△	While in control area
↘△	Enter control area
△↗	Out of control area
NW↘⊙ ⊙↗NE ⊖→E	Cleared to enter, depart, or cleared through control zone. Indicate direction of flight by arrow and appropriate compass letter. Maintain Special VFR conditions (altitude, if appropriate), while in control zone.
250K	Aircraft requested to adjust speed to 250 knots.
−20K	Aircraft requested to reduce speed 20 knots.
+30K	Aircraft requested to increase speed 30 knots.
Ⓦ	Local Special VFR operations in the vicinity of (name) airport are authorized until (time). Maintain special VFR conditions (altitude, if appropriate).
>	Before
<	After or Past
170 (red)	Inappropriate altitude/flight level for direction of flight. (Underline assigned altitude/flight level in red.)
/	Until
( )	Alternate instructions
Restriction	Restriction
⊤	At or Below

Symbol	*Meaning*
⊥	At or Above
--(Dash)	From—to (route, time, etc.)
(Alt)B(Alt)	Indicates a block altitude assignment. Altitudes are inclusive, and the first altitude shall be lower than the second. *Example:* 310B370
V<	Clearance void if aircraft not off ground by (time)
℄	Pilot cancelled flight plan
✓	*EN ROUTE:* Aircraft has reported at assigned altitude. *Example:* 80✓
✓	*TERMINAL:* Information forwarded (indicated information forwarded as required)
○ (red)	*EN ROUTE:* Information or revised information forwarded. (Circle, in red, inappropriate altitude/flight level for direction of flight or other control information when coordinated. Also circle, in red, the time (minutes and altitude when a flight plan or estimate is forwarded. Use this method in both inter-center and intra-center coordination.)
㊿	Other than assigned altitude reported (circle reported altitude)
$\left\lvert\frac{10}{6}\right\rvert$	DME holding (use with mileages) (Upper figure indicates distance from station to DME fix, lower figure indicates length of holding pattern. In this example, the DME fix is 10 miles out with a 6 mile pattern indicated.)
$\overparen{\text{(Mi.) (dir.)}}$	DME arc of VORTAC or TACAN
C(Freq.)	Contact (facility) on (freq.), (time, fix, or altitude, if appropriate). Insert frequency only when it is other than standard.
R	Radar contact
R	*EN ROUTE:* Requested altitude (preceding altitude information)
R̸	Radar service terminated
X	Radar contact lost
Ⓡ	Radar handoff (circle symbol when handoff completed)
RV	Radar vector
RX	Pilot resumed own navigation
E (red)	EMERGENCY
W (red)	WARNING
P	Point out initiated. Indicate the appropriate facility, sector, or position. *Example:* PZFW.

NOTE.—The absence of an airway or route number between two fixes in the route of flight indicates "direct"; no symbol or abbreviation is required.

2-60 thru 2-69 RESERVED

Section 4. RADIO AND INTERPHONE COMMUNICATIONS

2-70 RADIO COMMUNICATIONS

Use radio frequencies for the special purposes for which they are intended. A single frequency may be used for more than one function except as follows:

TERMINAL: When combining positions in the tower, do not use ground control frequency for airborne communications.

2-70 Note. — Due to the limited number of frequencies assigned to towers for the ground control function, it is very likely that airborne use of a ground control frequency could cause interference to other towers or interference to your aircraft from another tower. When combining these functions, it is recommended combining them on local control. The ATIS may be used to specify the desired frequency.

2-71 MONITORING

Monitor interphones and assigned radio frequencies continuously.

2-71 Note. — Although all FAA facilities, including RAPCON's and RATCF's, are required to monitor all assigned frequencies continuously, USAF facilities may not monitor all unpublished discrete frequencies.

2-72 PILOT ACKNOWLEDGEMENT/READBACK

a. When issuing clearances, instructions, or information, ensure acknowledgement by the pilot.

2-72a Note. — Pilots may acknowledge clearances, instructions or other information by using "Wilco", "Roger", "Affirmative", or other words or remarks.

2-72a Reference. — AIM-192c.

b. If altitude, heading, or other items are read back by the pilot, ensure the readback is correct. If incorrect or incomplete, make corrections as appropriate.

2-73 AUTHORIZED INTERRUPTIONS

As necessary, authorize a pilot to interrupt his communications guard.

2-73 Note. — Some users have adopted procedures to insure uninterrupted receiving capability with ATC when a pilot with only one operative communications radio must interrupt his communications guard because of a safety related problem requiring airborne communications with his company. In this event, pilots will request approval to abandon guard on the assigned ATC frequency for a mutually agreeable time period. Additionally, they will inform controllers of the NAVAID voice facility and the company frequency they will monitor.

2-74 AUTHORIZED TRANSMISSIONS

Transmit only those messages necessary for air traffic control or otherwise contributing to air safety.

2-74 Reference. — Order 7210.3 — 321.

2-75 AUTHORIZED RELAYS

a. Relay operational information to aircraft or aircraft operators as necessary. Do not agree to handle such messages on a regular basis. Give the source of any such message you relay.

b. Relay official FAA messages as required.

2-75b Note. — The FAA Administrator and Deputy Administrator will sometimes use code phrases to identify themselves in air-to-ground communications as follows:

a. Administrator — "Safe Air One."

b. Deputy Administrator — "Safe Air Two."

2-75b Example. —

"Miami Center, Jetstar One, this is Safe Air One, (message)".

c. Relay operational information to military aircraft flight planned to or operating on IR's.

2-76 RADIO MESSAGE FORMAT

Initiate radio communication with an aircraft by using the following format:

a. Initial callup:

(1) Identification of the aircraft being called.

(2) Identification of the calling unit.

(3) The type of message to follow when this will assist the pilot.

(4) The word "over" if required.

b. Replying to callup from aircraft:

(1) Identification of the aircraft initiating the callup.

(2) Identification of the replying unit.

(3) Transmit message.

(4) The word "over" if required.

c. Use the same format as for initial callup and reply after communication has been established except, after stating the identification of the calling or replying unit, state the message to be sent or acknowledge the message received.

d. Preface a clearance or instruction intended for a specific aircraft with the identification of that aircraft.

TERMINAL: You may omit aircraft identification after initial callup when conducting the final portion of a radar approach.

2-77 ABBREVIATED TRANSMISSIONS

Transmissions may be abbreviated as follows:

a. Use the identification prefix and the last 3 digits or letters of the aircraft identification after communications have been established and the type of aircraft is known. Do not abbreviate similar sounding aircraft identifications or the identification of an air carrier or other civil aircraft having an FAA authorized call sign.

2-77a Reference. — Aircraft Identification, 2-87.

b. Omit the facility identification after communication has been established.

c. Transmit the message immediately after the callup (without waiting for the aircraft's reply) when the message is short and receipt is generally assured.

d. Omit the word "over" if the message obviously requires a reply.

2-78 INTERPHONE TRANSMISSION PRIORITIES

Give priority to interphone transmissions as follows:

a. First priority — Emergency messages including essential information on aircraft accidents or suspected accidents. After an actual emergency has passed, give a lower priority to messages relating to that accident.

b. Second priority — Clearances and control instructions.

c. Third priority — Movement and control messages using the following order of preference when possible:

(1) Progress reports.

(2) Departure or arrival reports.

(3) Flight plans.

d. Fourth priority — Movement messages on VFR aircraft.

2-79 PRIORITY INTERRUPTION

Use the words "emergency" or "control" for interrupting lower priority messages when you have an emergency or control message to transmit.

2-80 INTERPHONE MESSAGE FORMAT

Use the following format for interphone (override/handoff line) intra/interfacility communications:

a. The caller states the identification of the position being called followed by the position identification of the caller.

b. The receiver states the position identification followed by an acknowledgment of the call.

2-80b Note. — If operationally beneficial, a. and b. may be reversed.

c. The caller states the message.

d. The receiver states the response to the caller's message followed by the receiver's operating initials.

e. The caller states his or her operating initials.

2-80 Example 1. —

Caller — "Denver High, R Twenty-five."

Receiver — "Denver High."

Caller — "Request direct Denver for Eastern Three Twenty-eight."

Receiver — "Eastern Three Twenty-eight direct Denver approved. H.F."

Caller — "G.M."

2-80 Example 2. —

Receiver — "Denver High, go ahead override."

Caller — "R Twenty-five, request direct Denver for Eastern Three Twenty-eight."

Receiver — "Eastern Three Twenty-eight direct Denver approved. H.F."

Caller — "G.M."

2-81 INTERPHONE MESSAGE TERMINATION

Terminate interphone messages with your operating initials.

2-82 WORDS AND PHRASES

Use the words or phrases in radiotelephone and interphone communication as contained in the Glossary, Appendix A. The word "heavy" shall be used in inter/intra facility communications for heavy jet identification and in communications with heavy jet aircraft.

2-82 Example. —

"United Fifty-eight heavy."

2-82 Note. — Most airlines will use the word "heavy" following the company prefix and trip number when establishing communications or when changing frequencies within a terminal facility's area.

2-83 EMPHASIS FOR CLARITY

Emphasize appropriate digits, letters, or similar sounding words to aid in distinguishing between similar sounding aircraft identifications. Additionally:

a. Notify each pilot concerned when communicating with aircraft having similar sounding identifications.

2-83a Examples. — "United Thirty-one United, Miami Center, Eastern Thirty-one is also on this frequency, acknowledge." "Eastern Thirty-one Eastern, Miami Center, United Thirty-one is also on this frequency, acknowledge."

2-83a Reference. — Aircraft Identification, 2-87. Order 7210.3 — 210, Aircraft Identification Problems.

b. Identify the interphone voice line on which the call is being made when two or more such lines are collocated at the receiving operating position.

2-83b Examples. —

"Washington Center, Washington Approach on the 57 line." "Chicago Center, O'Hare Tower handoff on the Departure West line."

2-84 ICAO PHONETICS

Use the ICAO phonetic alphabet in the Table to clarify the individual letter, as necessary.

2-84 Table. — ICAO Phonetics

A — Alfa
B — Bravo
C — Charlie
D — Delta
E — Echo
F — Foxtrot
G — Golf
H — Hotel
I — India
J — Juliett
K — Kilo
L — Lima
M — Mike
N — November
O — Oscar
P — Papa
Q — Quebec
R — Romeo
S — Sierra
T — Tango
U — Uniform
V — Victor
W — Whiskey
X — X-ray
Y — Yankee
Z — Zulu

2-85 NUMBERS USAGE

State numbers as follows:

a. Serial numbers — The separate digits.

2-85a Examples. —

Number	*Statement*
11,495	"One one four niner five."
20,069	"Two zero zero six niner."

b. Altitudes or flight levels:

(1) Altitudes — The separate digits of the thousand plus the hundreds.

2-85b(1) Example. —

Altitude	*Statement*
17,900	"One seven thousand niner hundred."

(2) Flight levels — The words "flight level" followed by the separate digits of the flight level.

2-85b(2) Examples. —

Flight level	*Statement*
180	"Flight level one eight zero"
275	"Flight level two seven five."

(3) MDA/DH Altitudes — The separate digits of the MDA/DH altitude

2-85b (3) Examples. —

MDA/DH Altitude	*Statement*
1,320	"Published minimum descent altitude, one three two zero"
486	"Published decision height, four eight six"

c. Time:

(1) General time information — The 4 separate digits of the hour and minutes based on the 24-hour clock in terms of Greenwich Mean Time (GMT).

2-85c(1) Examples. —

Time (12 hr.)	*Time (24 hr.)*	*Statement*
1:15 a.m.	0115	"Zero one one five."
1:15 p.m.	1315	"One three one five."

(2) Upon request — The 4 separate digits of the hours and minutes in terms of GMT, followed by the local standard time equivalents.

2-85c(2) Example. —

Time	*Statement*
1430 PST (2230 GMT)	"Two two three zero Greenwich, one four three zero Pacific."

(3) Time check — The word "time" followed by the 4 separate digits of the hour and minutes, and nearest quarter minute.

2-85c(3) Example. —

Time	*Statement*
1415 ¾	"Time, one four one five and three-quarters."

(4) Abbreviated time — The separate digits of the minutes only.

2-85c(4) Examples. —

Time	*Statement*
1415	"One five."
1420	"Two zero."

d. Field elevation — The words "field elevation" followed by the separate digits of the elevation.

2-85d Examples. —

Elevation	*Statement*
17 feet	"Field elevation, one seven."
817 feet	"Field elevation, eight one seven."
2,817 feet	"Field elevation, two eight one seven."

e. The number "0," except where it appears in group form — The word "zero."

2-85e Example. —

"Field elevation one six zero."

f. Altimeter setting — The word "altimeter" followed by the separate digits of the altimeter setting.

2-85f Example. —

Setting	Statement
30.01	"Altimeter, three zero zero one."

g. Surface wind — The word "wind" followed by the separate digits of the indicated wind direction to the nearest 10-degree multiple, the word "at," and the separate digits of the indicated velocity in knots.

2-85g Examples. —

"Wind zero three zero at two five."

"Wind two seven zero at one five peak gusts three five."

h. Heading — The word "heading" followed by the 3 separate digits of the number of degrees, omitting the word "degrees." Use heading 360 degrees to indicate a north heading.

2-85h Examples.-

Heading	Statement
5 degrees	"Heading zero zero five."
30 degrees	"Heading zero three zero."
360 degrees	"Heading three six zero."

i. Radar beacon codes — The separate digits of the 4-digit code.

2-85i Examples. —

Code	Statement
1000	"One zero zero zero."
2100	"Two one zero zero."

j. Runways — The word "runway," followed by the separate digits of the runway designation. For a parallel runway, state the word "left," "right," or "center" if the letter "L," "R," or "C" is included in the designation.

2-85j Examples. —

Designation	Statement
3	"Runway Three."
8L	"Runway Eight Left."
27R	"Runway Two Seven Right."

k. Frequencies —

(1) The separate digits of the frequency, inserting the word "point" where the decimal point occurs. Omit digits after the second digit to the right of the decimal point. When the frequency is in the L/MF band, include the word "kiloHertz."

2-85k(1) Examples. —

Frequency		Statement
126.55	MHz	"One two six point five five."
369.0	MHz	"Three six niner point zero."
121.5	MHz	"One two one point five."
135.275	MHz	"One three five point two seven."
302	kHz	"Three zero two kiloHertz."

(2) *USAF/USN:* Local channelization numbers may be used in lieu of frequencies for locally based aircraft when local procedures are established to ensure that local aircraft and ATC facilities use the same channelization.

2-85k(2) Example. —

Frequency		Statement
275.8	MHz	"Local channel one six."

l. Speeds —

(1) The separate digits of the speed followed by "knots", except as required by 5-101, Methods (Speed Adjustment).

2-85l(1) Examples. —

Speed	Statement
250	"Two five zero knots."
190	"One niner zero knots."

(2) The separate digits of the mach number preceded by "mach."

2-85l(2) Examples. —

Mach Number	Statement
1.5	"Mach one point five."
0.64	"Mach point six four."
0.7	"Mach point seven."

m. Miles — The separate digits of the mileage followed by the word mile.

2-85m Examples. —

"Three zero mile arc east of Nottingham."

"Traffic, one o'clock, two five miles, northbound, DC-8, flight level two seven zero."

2-86 FACILITY IDENTIFICATION

Identify facilities as follows:

a. Airport traffic control towers -- State the name of the facility followed by the word "tower." Where military and civil airports are located in the same general area and have similar names, state the name of the military service followed by the name of the military facility and the word "tower."

2-86a Examples. —

"Columbus Tower."

"Barksdale Tower."

"Navy Jacksonville Tower."

b. Air route traffic control centers — State the name of the facility followed by the word "center."

c. Approach control facilities, including RAPCON's, RATCF's, and ARAC's — State the name of the facility followed by the word "approach." Where military and civil facilities are located in the same general area and have similar names, state the name of the military service followed by the name of the military facility and the word "approach."

2-86c Examples. —

"Denver Approach."

"Griffiss Approach."

"Navy Jacksonville Approach."

d. Functions within a terminal facility — State the name of the facility followed by the name of the function.

2-86d Examples. —

"Boston Departure."

"La Guardia Clearance Delivery."

"O'Hare Ground."

e. When calling or replying on an interphone line which connects only 2 facilities, you may omit the facility name.

2-86e Example. —

"Bradford High, handoff."

f. FAA flight service stations — State the name of the station followed by the word "radio."

2-86f Example —

"Pittsburgh Radio."

g. Radar facilities having ASR or PAR but not providing approach control service — State the name of the facility, followed by the letters "G-C-A."

2-86g Examples. —

"Chanute G-C-A."

"Corpus Christi G-C-A."

"Davison G-C-A."

2-87 AIRCRAFT IDENTIFICATION

Identify aircraft as follows: use the full identification in reply to aircraft with similar sounding identifications. For other aircraft, the same identification may be used in reply that the pilot used in his initial callup except use the correct identification after communications have been established.

2-87 Reference. — Abbreviated Transmissions, 2-77.

a. Civil — State the aircraft type, the model, the manufacturer's name, or the prefix "November" followed by the numbers/letters of the aircraft registration.

2-87a Examples. —

"Jet Commander One Four Two Four."

"Douglas Three Zero Five Romeo."

"Bonanza One Two Three Four Tango."

"November One Two Three Four Golf."

2-87a Note. — The prefix "November" denotes a U.S. aircraft registry.

(1) Air carrier and other civil aircraft having FAA authorized call signs — State the call sign followed by the flight number in group form.

2-87a(1) Examples. —

"American Five Twenty-one."

"Commuter Six Eleven."

"General Motors Thirty-seven."

(2) If aircraft identification becomes a problem when the procedures specified in (1) are used, the call sign shall be restated after the flight number of the aircraft involved.

2-87a(2) Examples —

"American Five Twenty-one American."

"Commuter Six Eleven Commuter."

"General Motors Thirty-seven General Motors."

2-87a(2) Reference. — Order 7210.3 — 210, Aircraft Identification Problems.

(3) Air taxi and commercial operators not having FAA authorized call signs — State the prefix "TANGO" on initial contact, if used by the pilot, followed by the registration number. The prefix may be dropped in subsequent communications.

2-87a(3) Examples. —

"Tango Mooney Five Five Five Two Quebec."

"Tango One Two Three Four."

b. Civilian airborne ambulance — State the word "LIFEGUARD" followed by the type and the numbers/letters of the registration number.

2-87b Example. —

"LIFEGUARD Cessna Two Six Four Six."

c. U.S. military — State one of the following:

(1) The service name, followed by the word "copter," when appropriate, and the last 5 digits of the serial number.

2-87c(1) Examples. —

"Navy Five Six Seven One Three."

"Coast Guard Six One Three Two Seven."

"Air Guard One Three Five Eight Six"

"Army Copter Three Two One Seven Six."

2-87c(1) Note. — If aircraft identification becomes a problem, procedures in paragraph 2-87a(2) will apply.

(2) Special military operations — State one of the following followed by the last 5 digits of the serial number:

(a) Air evacuation flights — "AIR EVAC," "MARINE AIR EVAC," or "NAVY AIR EVAC."

2-87c(2)(a) Example. —

"AIR EVAC One Seven Six Five Two."

(b) Rescue flights — (Service name) "RESCUE."

2-87c(2)(b) Example. —

"Air Force RESCUE Six One Five Seven Niner."

(c) Military Airlift Command — "MAC."

2-87c(2)(c) Example. —

"MAC Seven Eight Five Six Two."

(d) Special Air Mission — "SAM."

2-87c(2)(d) Example. —

"SAM Niner One Five Six Two."

(e) USAF Contract Aircraft — "LOGAIR."

2-87c(2)(e) Example. —

"LOGAIR Seven Five Eight Two Six."

(3) Military tactical and training:

(a) U.S. Air Force, Air National Guard, Military District of Washington priority aircraft, and USAF civil disturbance aircraft — Pronounceable words of 3, 4, 5 or 6 letters followed by a 4, 3, 2, or 1-digit number.

2-87c(3)(a) Examples. —

"Paul Two Zero."

"Pat One Five Seven."

"Gaydog Four."

2-87c(3)(a) Note. — When the "Z" suffix described in paragraph 2-56 is added to identify aircraft piloted by USAF undergraduate pilots, the call sign will be limited to a combination of six characters.

(b) Navy or Marine fleet and training command aircraft — The service name and 2 letters, or a digit and a letter (use letter phonetic equivalents), followed by 2 or 3 digits.

2-87c(3)(b) Examples. —

"Navy Golf Alfa Two One."

"Marine Four Charlie Two Three Six."

(c) NORAD interceptors — An assigned double letter 2-digit flight number.

2-87c(3)(c) Example. — "Alfa Kilo One Five."

d. Foreign registry — State one of the following:

(1) Civil — The letters or digits of the aircraft registration or call sign.

2-87d(a) Example. —

"C-F-L-R-B."

(2) Air carrier — The abbreviated name of the operating company, followed by:

(a) The letters or digits of the registration or call sign.

2-87d(2)(a) Example. —

"Air France F-L-R-L-G."

(b) The flight number in group form.

2-87d(2)(b) Example. —

"Scandinavian Sixty-eight."

(3) Military — Except Canada, the name of the country and the military service followed by the separate digits or letters of the registration or call sign. Canadian Armed Force aircraft shall be identified by the word "Canforce" followed by the separate digits of the serial number, except that the Transport Command of the Canadian Armed Force shall be identified by the words "Canadian Military" and the Canadian Coast Guard shall be identified as "Canadian Coast Guard" followed by the separate digits of the serial number.

2-87d(3) Examples. —

"CANFORCE Five Six Two Seven."

"Brazilian Air Force Five Three Two Seven Six."

e. Presidential aircraft and Presidential family aircraft:

(1) When the President is aboard a military aircraft, state the name of the military service, followed by the word "One."

2-87e(1) Examples. —

"Air Force One." 'Army One." 'Marine One."

(2) When the President is aboard a civil aircraft, state the words "Executive One."

(3) When a member of the President's family is aboard any aircraft, if the U.S. Secret Service or the White House Staff determines it is necessary, state the words "Executive One Foxtrot."

f. Vice Presidential aircraft:

(1) When the Vice President is aboard a military aircraft, state the name of the military service, followed by the word "Two."

2-87f(1) Examples. —

"Air Force Two." "Army Two." "Marine Two."

(2) When the Vice President is aboard a civil aircraft, state the words "Executive Two."

(3) When a member of the Vice President's family is aboard any aircraft, if the U.S. Secret Service or the White House Staff determines it is necessary, state the words "Executive Two Foxtrot."

g. Other special flights:

(1) Department of Energy flights — State the letters "R-A-C" (use phonetic alphabet equivalents) followed by the last 4 separate digits of the aircraft registration number.

2-87g(1) Example. —

"Romeo Alfa Charlie One Six Five Three."

(2) Semiautomatic Flight Inspections — State the code name "SAFI" followed by the separate digits of the grid number as filed.

2-87g(2) Example. —

"Denver Center, SAFI Five Two Seven."

(3) Flight Inspection of Navigational Aids — State the call sign "FLIGHT CHECK" followed by the digits of the registration number.

2-87g(3) Example. —

"Flight Check Three Niner Six Five Four."

(4) USAF aircraft engaged in aerial samplimg missions — State the call sign "SAMP" followed by the last three digits of the serial number.

2-87g(4) Example. —

"SAMP Three One Six."

h. Use a pilot's name in identification of an aircraft only in special or emergency situations.

2-88 DESCRIPTION OF AIRCRAFT TYPES

Except as provided in d, describe aircraft as follows when issuing traffic information.

a. Military:

(1) Military designator, with numbers spoken in group form, or

2-88a(1) Examples. —

"F-Four." "B-Fifty-eight."

"Air Force bomber." "Navy fighter."

"Fighter." "Bomber."

(2) Service and type, or

(3) Type only if no confusion or misidentification is likely.

b. Air Carrier:

(1) Manufacturer's name or model.

(2) Add the company name or other identifying features when confusion or misidentification is likely.

2-88b Examples. —

"Lockheed Ten-eleven." "American Seven-oh-seven." "United Seven Thirty-seven."

2-88b Note. — *TERMINAL:* Pilots of "interchange" aircraft are expected to inform the tower on the first radio contact the name of the operating company and trip number followed by the company name, as displayed on the aircraft, and the aircraft type.

c. General Aviation and Air Taxi:

(1) Manufacturer's model, name, or designator.

(2) Add color when considered advantageous.

2-88c Examples. —

"Tri-Pacer." "PA Twenty-two."

"Cessna Three Ten." "Green Apache."

d. When issuing traffic information to aircraft following a heavy jet, specify the word "heavy" before the manufacturer's name and model.

2-88d Examples. —

"Heavy Lockheed Ten-eleven."

"Heavy Boeing Seven Forty-seven."

2-89 RESERVED

TABLE OF CONTENTS

Page

Chapter 3. AIRPORT TRAFFIC CONTROL — *TERMINAL*

Section 1. GENERAL

3-1 Provide Service 3-1
3-2 Preventive Control 3-1
3-3 Use of Active Runways 3-1
3-4 Coordination Between Local and Ground Controllers 3-1
3-5 Vehicles/Equipment/Personnel on Runways 3-1
3-6 Traffic Information 3-2
3-7 Position Determination 3-2
3-8 Low Level Wind Shear Advisories 3-2
3-9 Use of Tower Radar Displays 3-2
3-10 Observed Abnormalities 3-3
3-11 Airport Traffic Area Restrictions 3-3
3-12 Visually Scanning Runways 3-3
3-13—3-19 Reserved 3-3

Section 2. VISUAL SIGNALS

3-20 Light Signals 3-4
3-21 Warning Signal 3-4
3-22 Receiver-Only Acknowledgment 3-4
3-23—3-29 Reserved 3-4

Section 3. AIRPORT CONDITIONS

3-30 Landing Area Condition 3-5
3-31 Closed/Unsafe Runway Information 3-5
3-32 Timely Information 3-5
3-33 Braking Action 3-5
3-34 Braking Action Advisories 3-6
3-35 Arresting System Operation 3-6
3-36—3-39 Reserved 3-7

Section 4. AIRPORT LIGHTING

3-40 Emergency Lighting 3-8
3-41 Runway End Identifer Lights 3-8
3-42 Visual Approach Slope Indicators (VASI) 3-8
3-43 Approach Lights 3-8
3-44 ALS Intensity Settings 3-8
3-45 Sequenced Flashing Lights 3-9
3-46 MALSR/ODALS 3-9
3-47 Runway Edge Lights 3-9
3-48 High Intensity Runway, Runway Centerline, and Touchdown Zone Lights 3-10
3-49 HIRL Associated with MALSR 3-10
3-50 HIRL Changes Affecting RVR 3-10
3-51 Medium Intensity Runway Lights 3-10
3-52 Simultaneous Approach and Runway Edge Light Operation 3-10
3-53 High Speed Turnoff Lights 3-10
3-54 Taxiway Lights 3-10
3-55 Obstruction Lights 3-10
3-56 Rotating Beacon 3-11
3-57—3-59 Reserved 3-11

Section 5. RUNWAY SELECTION

3-60 Selection 3-12

TABLE OF CONTENTS—Continued

Page

3-61 STOL Runways 3-12
3-62 Tailwind Components 3-12
3-63—3-69 Reserved 3-12

Section 6. AIRPORT SURFACE DETECTION PROCEDURES

3-70 Equipment Usage 3-13
3-71 Information Usage 3-13
3-72 Identification 3-13
3-73—3-79 Reserved 3-13

Section 7. TAXI AND GROUND MOVEMENT PROCEDURES

3-80 Ground Traffic Movement 3-14
3-81 Taxi and Ground Movement Operation 3-14
3-82 Ground Operations 3-14
3-83 Runway Proximity 3-15
3-84 ILS Critical Areas 3-15
3-85—3-89 Reserved 3-16

Section 8. SPACING AND SEQUENCING

3-90 Sequence/Spacing Application 3-17
3-91 Touch-and-Go or Stop-and-Go or Low Approach 3-17
3-92 Simultaneous Same Direction Operation 3-17
3-93 Simultaneous Opposite Direction Operation 3-17
3-94—3-99 Reserved 3-18

Section 9. DEPARTURE PROCEDURES AND SEPARATION

3-100 Departure Information 3-19
3-101 Departure Delay Information 3-19
3-102 Departure Control Instructions 3-19
3-103 Takeoff Position Hold 3-19
3-104 Anticipating Separation 3-20
3-105 Traffic Information — Departing Aircraft 3-20
3-106 Same Runway Separation 3-20
3-107 Intersection Takeoff 3-21
3-108 Intersecting Runway Separation 3-22
3-109 Takeoff Clearance 3-23
3-110 Cancellation of Takeoff Clearance 3-23
3-111—3-119 Reserved 3-23

Section 10. ARRIVAL PROCEDURES AND SEPARATION

3-120 Landing Information 3-24
3-121 Forwarding Approach Information by Nonapproach Control Facilities 3-24
3-122 Same Runway Separation 3-24
3-123 Intersecting Runway Separation 3-25
3-124 Wheels Down Check 3-27
3-125 Wind Information 3-27
3-126 Landing Clearance 3-27
3-127 Anticipating Separation 3-28
3-128 Landing Clearance Without Visual Observation 3-28
3-129 Withholding Landing Clearance 3-28
3-130 Runway Exiting 3-28
3-131 Altitude Restricted Low Approach 3-28
3-132 Closed Traffic 3-28
3-133 Overhead Approach 3-28
3-134 Simulated Flameout Operations/Practice Precautionary Approaches 3-29
3-135—3-139 Reserved 3-30

TABLE OF CONTENTS—Continued

Page

Section 11. HELICOPTER OPERATIONS

3-140 Taxi and Ground Movement Operation 3-31
3-141 Helicopter Takeoff Clearance 3-31
3-142 Helicopter Departure Separation 3-32
3-143 Helicopter Arrival Separation 3-32
3-144 Simultaneous Landings or Takeoffs 3-32
3-145 Helicopter Landing Clearance 3-32
3-146—3-149 Reserved 3-33

Section 12. SEA LANE OPERATIONS

3-150 Application 3-34
3-151 Departure Separation 3-34
3-152 Arrival Separation 3-34

Chapter 3. AIRPORT TRAFFIC CONTROL — TERMINAL

Section 1. GENERAL

3-1 PROVIDE SERVICE

Provide airport traffic control service based only upon observed or known traffic and airport conditions.

3-1 Note. — When operating in accordance with the FAR's, it is the responsibility of the pilot to avoid collision with other aircraft. However, due to the limited space around terminal locations, traffic information can aid pilots in avoiding collision between aircraft operating within control zones, airport traffic areas, terminal radar service areas, terminal control areas, and transiting aircraft operating in proximity to terminal locations.

3-2 PREVENTIVE CONTROL

Provide preventive control service only to aircraft operating in accordance with a letter of agreement. When providing this service, issue advice or instructions only if a situation develops which requires corrective action.

3-2 Note. — Preventive control differs from other airport traffic control in that repetitious, routine approval of pilot action is eliminated. Controllers intervene only when they observe a traffic conflict developing.

3-3 USE OF ACTIVE RUNWAYS

For ATC purposes, the local controller has primary responsibility for operations on the active runway and must control the use of those runways. Positive coordination and control are required as follows:

3-3 Note. — Exceptions may be authorized only as provided in paragraph 1-9 and Order 7210.3 — 1205 where justified by extraordinary circumstances at specific locations.

3-3 Reference. — Order 72103 — 1205.b., Use of Active Runways.

a. Ground control must obtain approval from local control before authorizing an aircraft or vehicle to cross or use any portion of an active runway.

b. Aircraft may be authorized to taxi along an active runway by local control, via direct communications on the control frequency, or by ground control after coordination with local control is completed.

c. The local controller shall coordinate with the ground controller before using a runway not previously designated as active.

3-3c Reference. — Order 7210.3 — 1204, Selecting Active Runways.

3-4 COORDINATION BETWEEN LOCAL AND GROUND CONTROLLERS

Local and ground controllers shall exchange information as necessary for the safe and efficient use of airport runways and movement areas. This may be accomplished via verbal means, flight progress strips, other written information, or automation displays. As a minimum, provide aircraft identification and applicable runway/intersection/taxiway information as follows:

a. Ground control shall notify local control when a departing aircraft has been taxied to a runway other than one previously designated as active.

3-4a Reference. — Use of Active Runways, 3-3. Order 7210.3 — 1204, Selecting Active Runways.

b. Ground control shall notify local control of any aircraft taxied to an intersection for takeoff, unless departure from that intersection is specifically designated via prior coordination or facility directive as the standard operating procedure for the runway to be used. When standard procedures require departures to use a specific intersection, ground control shall notify local control when aircraft are taxied to other portions of the runway for departure.

3-4b Reference. — Intersection Takeoff, 3-107.

c. When the runways in use for landing/departing aircraft are not visible from the tower or the aircraft using them are not visible on radar, advise the local/ground controller of the aircraft's location before releasing the aircraft to the other controller.

3-5 VEHICLES/EQUIPMENT/PERSONNEL ON RUNWAYS

Ensure that the runway to be used is clear of all known ground vehicles, equipment, and personnel before a departing aircraft starts takeoff or a landing aircraft crosses the runway threshold.

3-5 Reference. — Touch-and-Go or Stop-and-Go or Low Approach, 3-91.

3-6 TRAFFIC INFORMATION

a. Describe vehicles, equipment, or personnel on or near the movement area in a manner which will assist pilots in recognizing them.

3-6a Examples. —

"Mower to left of Runway Two Seven."

"Trucks crossing approach end of Runway Two Five."

"Workman on Taxiway Bravo."

"Aircraft to left of Runway One Eight."

b. Describe the relative position of traffic in an easy to understand manner, such as "to your right." or "ahead of you."

3-6b Examples. —

"Traffic, Eastern DC-9 on downwind leg to your left."

"Twin Bonanza inbound from outer marker on straight-in approach to Runway One Seven."

c. When using a certified tower radar display, you may issue traffic advisories using the standard radar phraseology prescribed in paragraph 2-21.

3-7 POSITION DETERMINATION

a. Determine the position of an aircraft before issuing taxi instructions or takeoff clearance.

3-7 Note. — The aircraft's position may be determined visually by the controller, by pilots, or through use of ASDE.

b. When a local controller delivers or amends an ATC clearance to an aircraft awaiting departure and that aircraft is holding short of a runway or is holding in position on a runway, an additional clearance shall be issued to prevent the possibility of the aircraft inadvertently taxiing onto the runway and/or beginning takeoff roll. In such cases, append one of the following ATC instructions as appropriate:

(1) HOLD SHORT OF RUNWAY, *or*

(2) HOLD IN POSITION.

3-8 LOW LEVEL WIND SHEAR ADVISORIES

At those locations equipped with a Low Level Wind Shear Alert System, the local controller shall provide wind information as follows:

3-8 Note. — The LLWAS is designed to detect possible low level wind shear conditions around the periphery of an airport. It does not detect wind shear beyond that limitation.

3-8 Reference. — Order 7210.3 — 1222, Low Level Wind Shear Alert System (LLWAS).

a. If an alert is received, issue the centerfield wind and the displayed field boundary wind.

Phraseology:

WIND SHEAR ALERT. CENTERFIELD WIND (direction) AT (velocity). (Location of sensor) BOUNDARY WIND (direction) AT (velocity).

3-8a Example. —

"Wind shear alert. Centerfield wind, two seven zero at one zero. East boundary wind, one eight zero at two five."

b. If unstable conditions produce multiple alerts, issue an advisory that there are wind shear alerts in two/several/all quadrants. Then, issue the centerfield wind in accordance with 3-100b followed by the field boundary wind most appropriate to the aircraft operation.

Phraseology:

WIND SHEAR ALERTS TWO/SEVERAL/ALL QUADRANTS. CENTERFIELD WIND (direction) AT (velocity). (Location of sensor) BOUNDARY WIND (direction) AT (velocity).

3-8b Example. —

"Wind shear alerts two quadrants. Centerfield wind, two one zero at one four. West boundary wind, one four zero at two two."

c. If requested by the pilot, issue specific field boundary wind information even though the LLWAS may not be in an alert status.

3-8c Example. —

"Northeast boundary wind, two three zero at two zero."

3-8c Note. — The requirements of 3-100, 3-8a. and b., and 3-120. (reference issuance of wind information) remain valid, as appropriate.

3-9 USE OF TOWER RADAR DISPLAYS

a. Local controllers may use certified tower radar displays for the following purposes:

(1) To determine an aircraft's identification, exact location, or spatial relationship to other aircraft.

3-9a(1) Note. — This authorization does not alter visual separation procedures. When employing visual separation, the provisions of paragraph 7-10 apply unless otherwise authorized by AAT-1.

3-9a(1) Reference. — Primary Radar Identification Methods, 5-51; Beacon Identification Methods, 5-52; ARTS/PIDP Identification Methods, 5-53.

(2) To provide aircraft with radar traffic advisories.

(3) To provide a direction or suggested headings to VFR aircraft as a method for radar identification or as an advisory aid to navigation.

Phraseology:

(Identification), PROCEED (direction)-BOUND, (other instructions or information as necessary),

or

(Identification), SUGGESTED HEADING (degrees), (other instructions as necessary).

3-9a(3) Note. — It is important that the pilot be aware of the fact that the directions or headings being provided are suggestions or are advisory in nature. This is to keep the pilot from being inadvertently mislead into assuming that radar vectors (and other associated radar services) are being provided when, in fact, they are not.

(4) To provide information and instructions to aircraft operating within the airport traffic area.

3-9a(4) Example. —

"Turn base leg now."

3-9a Note. — Unless otherwise authorized, tower radar displays are intended to be an aid to local controllers in meeting their responsibilities to the aircraft operating on the runways or within the airport traffic area. They are not intended to provide radar benefits to pilots except for those accrued through a more efficient and effective local control position. In addition, local controllers at nonapproach control towers must devote the majority of their time to visually scanning the runways and local area; an assurance of continued positive radar identification could place distracting and operationally inefficient requirements upon the local controller. Therefore, since the requirements of paragraph 5-50 cannot be assured, the radar functions prescribed above are not considered to be radar services and pilots should not be advised of being in "radar contact."

b. Additional functions may be performed provided the procedures have been reviewed and authorized by appropriate management levels.

3-10 OBSERVED ABNORMALITIES

When requested by a pilot or when you deem it necessary, inform an aircraft of any observed abnormal aircraft condition.

Phraseology:

(Item) APPEAR/S (observed condition).

3-10 Examples. —

"Landing gear appears down and in place."

"Rear baggage door appears open."

3-11 AIRPORT TRAFFIC AREA RESTRICTIONS

a. If traffic conditions permit, approve a pilot's request to cross an airport traffic area or exceed the airport traffic area speed limit. Do not, however, approve a speed in excess of 250 knots (288 mph) unless the pilot informs you a higher minimum speed is required.

3-11a Note. — FAR 91.70 permits speeds in excess of 250 knots (288 mph) when so required or recommended in the airplane flight manual or required by normal military operating procedures.

3-11a Reference. — Airport Traffic Areas, 2-16.

b. Do not approve a pilot's request or ask a pilot to conduct unusual maneuvers within an airport traffic area if they are not essential to the performance of the flight.

3-11b Note. — These unusual maneuvers include unnecessary low passes, unscheduled flybys, practice instrument approaches to altitudes below specified minima (unless a landing or touch-and-go is to be made), or any so-called "buzz jobs" wherein a flight is conducted at a low altitude and/or a high rate of speed for thrill purposes. Such maneuvers increase hazards to persons and property and contribute to noise complaints.

3-12 VISUALLY SCANNING RUNWAYS

a. Local controllers shall visually scan runways to the maximum extent possible.

b. Ground control shall assist local control in visually scanning runways, especielly when runways are in close proximity to movement areas.

3-13 thru 3-19 RESERVED

Section 2. VISUAL SIGNALS

3-20 LIGHT SIGNALS

Use air traffic control light signals from the Table to control aircraft and the movement of vehicles, equipment, and personnel on the movement area when radio communications cannot be employed.

3-20 Reference. — Order 7210.3 — 430, Letters of Agreement.

3-20 Table. — ATC Light Signals.

	Meaning		
Color and type of signal	*Aircraft on the ground*	*Aircraft in flight*	*Movement of vehicles, equipment, and personnel*
Steady green	Cleared for takeoff	Cleared to land	Cleared to cross; proceed; go
Flashing green	Cleared to taxi	Return for landing (to be followed by steady green at the proper time)	Not applicable
Steady red	Stop	Give way to other aircraft and continue circling	Stop
Flashing red	Taxi clear of landing area/runway in use	Airport unsafe — do not land	Clear the taxiway/runway
Flashing white	Return to starting point on airport	Not applicable	Return to starting point on airport
Alternating red and green	General Warning Signal — Exercise Extreme Caution		

3-21 WARNING SIGNAL

Direct a general warning signal to aircraft or vehicle operators, as appropriate, when:

3-21 Note. — **The warning signal is not a prohibitive signal and can be followed by any other light signal, as circumstances permit.**

a. Aircraft are converging and a collision hazard exists.

b. Mechanical trouble exists of which the pilot might not be aware.

c. Other hazardous conditions are present which call for intensified pilot or operator alertness. These conditions may include obstructions, soft field, ice on the runway, etc.

3-22 RECEIVER-ONLY ACKNOWLEDGMENT

To obtain acknowledgment from an aircraft equipped with receiver only, request the aircraft to do the following:

a. Fixed-wing aircraft—

(1) Between sunrise and sunset—

(a) Move ailerons or rudders while on the ground.

(b) Rock wings while in flight.

(2) Between sunset and sunrise — Flash navigation or landing lights.

b. Helicopters—

(1) Between sunrise and sunset—

(a) While hovering, either turn the helicopter toward the controlling facility and flash the landing light or rock the tip path plane.

(b) While in flight, either flash landing light or rock the tip path plane.

(2) Between sunset and sunrise — Flash landing light or search light.

3-23 thru 3-29 RESERVED

Section 3. AIRPORT CONDITIONS

3-30 LANDING AREA CONDITION

If you observe or are informed of any condition which affects the safe use of a landing area:

3-30 Note 1. — The airport management/military operations office is responsible for observing and reporting the condition of the landing area.

3-30 Note 2. — It is the responsibility of the agency operating the airport to provide the tower with current information regarding airport conditions.

3-30 Note 3. — A disabled aircraft on a runway, after occupants are clear, is normally handled by Flight Standards and airport management/military operations office personnel in the same manner as any obstruction; e.g., construction equipment.

a. Relay the information to the airport manager/military operations office concerned.

b. Copy verbatim any information received and record the name of the person submitting it.

c. Confirm information obtained from other than authorized airport or FAA personnel unless this function is the responsibility of the military operations office.

3-30c Note. — Civil airport managers are required to provide a list of airport employees who are authorized to issue information concerning conditions affecting the safe use of the airport.

d. If you are unable to contact the airport management or operator, issue a Notice to Airmen publicizing an unsafe condition and inform the management or operator as soon as practicable.

3-30d Example. —

"Disabled aircraft on runway."

3-30d Note 1. — Legally, only the airport management/military operations office can close a runway.

3-30d Note 2. — Military controllers are not authorized to issue Notices to Airmen. It is the responsibility of the military operations office.

e. Issue to aircraft only factual information, as reported by the airport management concerning the condition of the runway surface, describing the accumulation of precipitation.

3-30e Example. —

"All runways covered by compacted snow six inches deep."

3-31 CLOSED/UNSAFE RUNWAY INFORMATION

If an aircraft requests to takeoff, land, or touch-and-go on a closed or unsafe runway, inform the pilot the runway is closed or unsafe, and

a. If the pilot persists in his request, quote him the appropriate parts of the Notice to Airmen applying to the runway and inform him that a clearance cannot be issued.

b. Then, if the pilot insists and in your opinion the intended operation would not adversely affect other traffic, inform him that the operation will be at his own risk.

Phraseology:

RUNWAY (runway number) CLOSED/UNSAFE.

If appropriate,

(quote Notice to Airmen information), UNABLE TO

ISSUE DEPARTURE/LANDING/TOUCH-AND-GO CLEARANCE.

DEPARTURE/LANDING/TOUCH-AND-GO WILL BE AT YOUR OWN RISK.

c. Except as permitted by 4-86, where parallel runways are served by separate ILS systems and one of the runways is closed, the ILS associated with the closed runway should not be used for approaches unless not using the ILS would have an adverse impact on the operational efficiency of the airport.

3-31 Reference. — Landing Clearance, 3-126.

3-32 TIMELY INFORMATION

Issue airport condition information necessary for an aircraft's safe operation in time for it to be useful to the pilot. Include the following, as appropriate:

a. Construction work on or immediately adjacent to the movement area.

b. Rough portions of the movement area.

c. Braking conditions caused by ice, snow, slush, or water.

d. Snowdrifts or piles of snow on or along the edges of the area and the extent of any plowed area.

e. Parked aircraft on the movement area.

f. Irregular operation of part or all of the airport lighting system.

g. Other pertinent airport conditions.

3-32 Reference. — Airport Conditions, 4-70.

3-33 BRAKING ACTION

Furnish quality of braking action, as received from pilots or the airport management, to all aircraft as follows:

a. Describe the quality of braking action using the terms "good," "fair," "poor," "nil," or a combination of these terms. If the pilot or airport management reports braking action in other than the foregoing terms, ask him to categorize braking action in these terms.

3-33a Note. — The term "nil" is used to indicate bad or no braking action.

b. Include type of aircraft or vehicle from which the report is received.

3-33a and b Examples. —

"Braking action fair to poor, reported by a D-C Ten."

"Braking action poor, reported by a Boeing Seven Twenty-seven."

c. If the braking action report affects only a portion of a runway, obtain enough information from the pilot or airport management to describe the braking action in terms easily understood by the pilot.

3-33c Examples. —

"Braking action poor first half of runway, reported by a Lockheed Ten Eleven."

"Braking action poor beyond the intersection of Runway Two Seven, reported by a Boeing Seven Twenty-seven."

3-33c Note. — Descriptive terms, such as the first or the last half of the runway, should normally be used rather than landmark descriptions, such as opposite the fire station, south of a taxiway, etc. Landmarks extraneous to the landing runway are difficult to distinguish during low visibility, at night, or anytime a pilot is busy landing an aircraft.

d. Furnish runway friction measurement readings/values as received from airport management to aircraft as follows:

(1) At locations where friction measuring devices, such as Mu-Meter, Saab Friction Tester (SFT), and Skiddometer are in use, furnish information as received from the airport management to pilots on request. Use the name of the device followed by the number for each of three runway segments, a word describing the cause of the runway friction problem, and the time of the report.

3-33d(1) Examples. —

"(Name of device), eight, six, seven, snow at zero niner three zero."

"(Name of device), thirty-five, twenty-six, thirty, sleet at one zero one five."

(2) Issue the RUNWAY SURFACE CONDITION and/or the RUNWAY CONDITION READING (RCR), if provided, to all USAF and ANG aircraft. Issue the RCR to other aircraft upon pilot request.

3-33d(2) Example. —

"Ice on runway, RCR zero five, patchy."

3-33d(2) Note 1. — USAF has established RCR procedures for determining the average deceleration readings of runways under conditions of water, slush, ice, or snow. The use of the RCR code is dependent upon the pilot's having a "stopping capability chart" specifically applicable to his aircraft.

3-33d(2) Note 2. — USAF offices furnish RCR information at airports serving USAF and ANG aircraft.

3-33d(2) Reference. — Airport Conditions, 4-70.

3-34 BRAKING ACTION ADVISORIES

a. When runway braking action reports are received from pilots or the airport management which include the terms "poor" or "nil." or whenever weather conditions are conducive to deteriorating or rapidly changing runway conditions, include on the ATIS broadcast the statement "BRAKING ACTION ADVISORIES ARE IN EFFECT."

3-34a Reference. — Order 7210.3 — 1230, Automatic Terminal Information Service.

b. During the time Braking Action Advisories are in effect, take the following action:

(1) Issue the latest braking action report for the runway in use to each arriving and departing aircraft. When possible, include reports from heavy jet aircraft when the arriving or departing aircraft is a heavy jet.

(2) Advise the airport management that runway braking action reports of "poor" or "nil" have been received.

3-34b(2) Reference. — Order 7210.3 — 430, Letters of Agreement.

(3) Solicit PIREP's of runway braking action.

3-34b(3) Reference. — PIREP Information, 2-102.

3-35 ARRESTING SYSTEM OPERATION

a. For normal operations, arresting systems remotely controlled by air traffic control shall remain in the retracted or down position.

3-35a Note 1. — USN Runway Arresting Gear-Barriers are not operated by air traffic control personnel. Readiness/rigging of the equipment is the responsibility of the operations department.

3-35a Note 2. — A request to raise a barrier or hook cable means the barrier or cable on the departure end of the the runway. If an approach end engagement is required, the pilot or military authority will specifically request that the approach end cable be raised.

Reference. — Order 7610.4, 1561-1565.

b. Raise aircraft arresting systems whenever:

(1) Requested by a pilot.

3-35b(1) Note. — The standard emergency phraseology for a pilot requesting an arresting system to be raised for immediate engagement is "Barrier-Barrier-Barrier" or "Cable-Cable-Cable."

(2) Requested by military authority; e.g., airfield manager, supervisor of flying, mobile control officer, etc.

(3) A military jet aircraft is landing with known or suspected radio failure or conditions

3-44 Table. — ALS Intensity Setting

Step	Visibility — (Applicable to runway served by lights)	
	Day	*Night*
5	Less than 1 mile*	When requested
4	1 to but not including 3 miles	When requested
3	3 to but not including 5 miles	Less than 1 mile*
2	5 to but not including 7 miles	1 to 3 miles inclusive
1	When requested	Greater than 3 miles

*and/or 6,000 feet or less of the RVR on the runway served by the ALS and RVR.

3-44 Note. — Daylight Steps 2 and 3 provide recommended settings applicable to conditions in subparagraphs b. and c.

3-45 SEQUENCED FLASHING LIGHTS

Operate Sequenced Flashing Lights:

3-45 Note. — SFL are a component of the ALS and cannot be operated when the ALS is off.

a. When the visibility is less than 3 miles and instrument approaches are being made to the runway served by the associated ALS.

b. *USAF*: When the ceiling is below 1,000 feet or the visibility is less than 3 miles and approaches are being made to the runway served by the associated ALS.

c. As requested by the pilot.

d. As you deem necessary, if not contrary to pilot's request.

3-46 MALSR/ODALS

Operate MALSR/ODALS that have separate on-off and intensity setting controls in accordance with the following Tables except:

a. When facility directives specify other settings to meet local atmospheric, topographic, and twilight conditions.

b. As requested by the pilot.

c. As you deem necessary, if not contrary to pilot's request.

3-46 Table 1. — Two Step MALS/One Step RAIL/Two Step ODALS

Settings		Visibility	
		Day	*Night*
MALS/ODALS............. RAIL..............................	Hi On	Less than 3 miles	Less than 3 miles*
MALS/ODALS............. RAIL..............................	Low Off	When requested	3 miles or more

* At locations providing part-time control tower service, if duplicate controls are not provided in the associated FSS, the MALSR/ODALS shall be set to low intensity during the hours of darkness when the tower is unmanned.

3-46 Table 2. — Three Step MALS/Three Step RAIL

Settings	Visibility	
	Day	*Night*
3	Less than 2 miles	Less than 1 mile
2	2 to 5 miles inclusive	1 to but not including 3 miles*
1	When requested	3 miles or more

*At locations providing part-time control tower service, if duplicate controls are not provided in the FSS on the airport, the air-to-ground radio link shall be activated during the hours of darkness when the tower is unmanned. If there is no radio air-to-ground control, the MALSR/ODALS shall be set on intensity setting 2 during the hours of darkness when the tower is unmanned. (See Order 7210.3 — 1253.)

3-47 RUNWAY EDGE LIGHTS

Operate the runway edge light system/s serving the runway/s in use as follows:

a. Between sunset and sunrise, turn the lights on:

(1) For departures — Before an aircraft taxies onto the runway and until it leaves the airport traffic area.

(2) For arrivals —

(a) IFR aircraft — Before the aircraft begins final approach, or

(b) VFR aircraft — Before the aircraft enters the airport traffic area, and

(c) Until the aircraft has taxied off the landing runway.

b. Between sunrise and sunset, turn the lights on as in a(1) and (2) above when the surface visibility is less than 2 miles.

c. As required by facility directives to meet local conditions.

d. Different from a., b., or c. above when:

(1) You consider it necessary, or

(2) Requested by a pilot and no other known aircraft will be adversely affected.

3-47d(2) Note. — Pilots may request lights to be turned on or off contrary to a., b., or c. above. However, FAR 121 and 135 operators are required to land/takeoff on lighted runways/heliport landing areas at night.

e. Do not turn on the runway edge lights when a NOTAM closing the runway is in effect.

3-47 Note. — Application concerns use for takeoffs/landings/approaches and does not preclude turning lights on for use of unaffected portions of a runway for taxiing aircraft, surface vehicles, maintenance, repair, etc.

3-47 Reference. — Order 7210.3 — 1252.

3-48 HIGH INTENSITY RUNWAY, RUNWAY CENTERLINE, AND TOUCHDOWN ZONE LIGHTS

Operate high intensity runway and associated runway centerline and touchdown zone lights in accordance with the Table, except:

a. Where a facility directive specifies other settings to meet local conditions.

b. As requested by the pilot.

c. As you deem necessary, if not contrary to pilot request.

3-48 Table. — HIRL, RCLS, TDZL Intensity Setting

Step	Visibility	
	Day	*Night*
5	Less than 1 mile*	When requested
4	1 to but not including 2 miles*	Less than 1 mile*
3	2 to but not including 3 miles	1 to but not including 3 miles*
2	When requested	3 to 5 miles inclusive
1	When requested	More than 5 miles

*and/or appropriate RVR/RVV equivalent.

3-49 HIRL ASSOCIATED WITH MALSR

Operate HIRL which control the associated MALSR in accordance with the accompanying intensity setting Table, except:

a. As requested by the pilot.

b. As you deem necessary, if not contrary to the pilot's request.

3-49 Table. — HIRL associated with MALSR

Step	Visibility	
	Day	*Night*
5	Less than 1 mile	When requested
4	1 to but not including 2 miles	Less than 1 mile
3	2 to but not including 3 miles	1 to but not including 3 miles
2	When requested	3 to 5 miles inclusive
1	When requested	More than 5 miles

3-49 Note. — When going from a given brightness step setting to a lower setting, rotation of the brightness control to a point below the intended step setting and then back to the appropriate step setting will ensure that the MALSR will operate at the appropriate brightness.

3-50 HIRL CHANGES AFFECTING RVR

Keep the appropriate approach controller or PAR controller informed, in advance if possible, of HIRL changes that affect RVR.

3-51 MEDIUM INTENSITY RUNWAY LIGHTS

Operate MIRL or MIRL which control the associated MALSR in accordance with the Table except:

a. As requested by the pilot.

b. As you deem necessary, if not contrary to the pilot's request.

3-51 Table. — MIRL Intensity Setting

Step	Visibility	
	Day	*Night*
3	Less than 2 miles	Less than 1 mile
2	2 to 3 miles	1 to 3 miles
1	When requested	More than 3 miles

3-51 Reference. — See 3-49 Note.

3-52 SIMULTANEOUS APPROACH AND RUNWAY EDGE LIGHT OPERATION

Turn on the runway edge lights for the runway in use whenever the associated approach lights are on. If multiple runway light selection is not possible, you may leave the approach lights on and switch the runway lights to another runway to accommodate another aircraft

3-52 Reference. — Runway Edge Lights, 3-47.

3-53 HIGH SPEED TURNOFF LIGHTS

Operate high speed turnoff lights:

a. Whenever the associated runway lights are used for arriving aircraft. Leave them on until the aircraft has either entered a taxiway or passed the last light.

b. As required by facility directives to meet local conditions.

c. As requested by the pilot.

3-54 TAXIWAY LIGHTS

Operate taxiway lights serving the taxiways, or portions thereof, in use as follows:

a. Between sunset and sunrise — Before an aircraft taxies onto the taxiway (normally at the time taxi information is issued) and until it taxies off it.

b. At other times when you consider it necessary and as required by local instructions.

3-55 OBSTRUCTION LIGHTS

If controls are provided, turn the lights on between sunset and sunrise.

3-56 ROTATING BEACON

If controls are provided, turn the rotating beacon on:

a. Between sunset and sunrise.

b. Between sunrise and sunset when the reported ceiling or visibility is below basic VFR minima.

3-57 thru 3-59 RESERVED

Section 5. RUNWAY SELECTION

3-60 SELECTION

a. Except where a "runway use" program is in effect, use the runway most nearly aligned with the wind when five knots or more or the "calm wind" runway when less than five knots (set tetrahedrons accordingly) unless use of another runway:

3-60a Note 1. — If a pilot prefers to use a runway different from that specified, he/she is expected to advise ATC.

3-60a Note 2. — At airports where a "runway use" program is established, ATC will assign runways deemed to have the least noise impact. If in the interest of safety a runway different from that specified is preferred, the pilot is expected to advise ATC accordingly. ATC will honor such requests and advise pilots when the requested runway is noise sensitive.

3-60a Reference. — Order 8400.9, National Safety and Operational Criteria for Runway Use Programs.

(1) Will be operationally advantageous.

(2) Is requested by the pilot.

b. When conducting aircraft operations on other than the advertised active runway, state the runway in use.

3-61 STOL RUNWAYS

Use STOL runways as follows:

a. A designated STOL runway may be assigned only when requested by the pilot or as specified in a letter of agreement with an aircraft operator.

b. Issue the measured STOL runway length if the pilot requests it.

3-62 TAILWIND COMPONENTS

When authorizing use of runways and a tailwind component exists, always state both wind direction and velocity.

3-62 Note. — The wind may be described as "calm" when appropriate.

3-62 Reference. — Calm Wind Condition, 2-104.

3-63 thru 3-69 RESERVED

3-82 Reference. — AC 90-23, Wake Turbulence, paragraphs 10 and 11.

3-83 RUNWAY PROXIMITY

Hold a taxiing aircraft clear of a runway as follows:

a. At established holding points marked by taxiway hold lines/signs.

b. If no hold lines/signs are established, instruct aircraft to hold short of a specific runway.

c. Issue traffic information as necessary.

3-83 Note. — Establishing hold lines/signs are the responsibility of the airport manager. Standards for accomplishing this are contained in Advisory Circulars 150/5340-1E and 150/5340-18A. Information on taxiway markings is published in the AIM.

3-83 Reference. — Taxi and Ground Movement Operation, 3-81; Altitude Restricted Low Approach, 3-131.

3-84 ILS CRITICAL AREAS

If an ILS critical area is marked and identifiable, restrict aircraft and surface vehicle operations, and provide information as follows when the ILS is being used for approach/landing guidance.

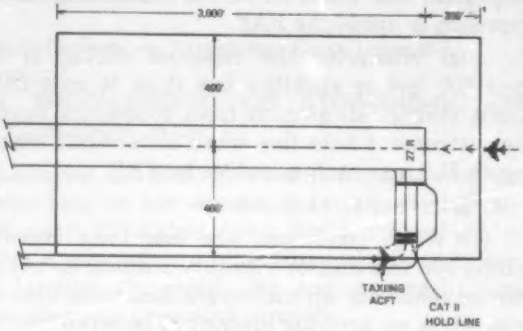
3-84 Note 1. — Restrictions to the operation of aircraft and vehicles are required to assure the integrity of ILS course signals and to meet obstacle clearance needs. Airport operators are responsible for installing and maintaining appropriate signs and markings delineating taxi lanes, hold lines, and no parking areas associated with ILS critical areas.

3-84 Note 2. — At USAF bases, the critical areas and the obstacle critical area (touchdown area) will be protected by an instrument hold line. An instrument hold line is marked only when a restriction short of the runway is necessary. See AFR 60-5 for the dimensions of the critical areas and the obstacle critical areas (touchdown areas).

3-84 NOTE 3. — For holding purposes, no point on the longitudinal axis of the aircraft is permitted past the hold line.

a. Obstacle Critical Area — A rectangular obstacle critical area surrounds the approach end of each Category II and Category III ILS runway. When conditions are reported ceiling less than 200 feet and/or RVR 2,000 or less *(USAF:* ½ mile if no RVR), do not authorize vehicles/aircraft to be in the area when an aircraft conducting an approach/missed approach enters/is over the area.

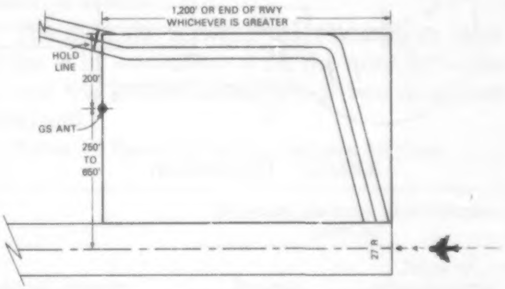
3-84a Note. — *USAF:* A rectangular obstacle critical area surrounds the approach end of each Category II/III ILS or PAR (with HAT below 200 feet) runway.



3-84a(1) Illustration

b. Glide Slope Critical Area —

(1) *USAF NOT APPLICABLE.* When conditions are less than reported ceiling 800 feet and/or visibility 2 miles, do not authorize vehicles/aircraft to operate in the area when an arriving aircraft is inside the ILS FAF unless that aircraft has reported the airport in sight and is circling/sidestepping to land on other than the ILS runway.



3-84b(1) Illustration

3-84b(1) Note. — The glide slope critical area extends to the near edge of the runway that the ILS serves. It does not include the runway.

3-84b(1) Reference. — Order 6750.16.

(2) *USAF:* The following glide slope critical area procedures apply to CAT I and II ILS systems. See AFR 60-5 for the glide slope critical area dimensions.

(a) Whenever the reported ceiling is at or above 800 feet and visibility at or above 2 miles, permit all aircraft to proceed to the runway hold line.

(b) Whenever the reported ceiling is less than 800 feet or visibility less than 2 miles, but at or above 200 feet or visibility at or above ½ mile (RVR 2,400), restrict all aircraft larger than fighter type/size from proceeding beyond the instru-

ment hold line when an aircraft executing an ILS approach is inside the FAF.

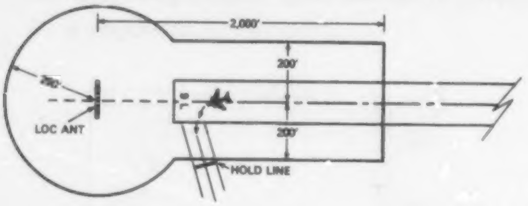
(c) Whenever the reported ceiling is less than 200 feet or visibility less than ½ mile (RVR 2,400), restrict all aircraft from proceeding beyond the instrument hold line when an aircraft executing an ILS approach is inside the FAF.

c. Localizer Critical Area —

(1) When conditions are less than reported ceiling 800 feet and/or visibility 2 miles, do not authorize vehicle or aircraft operations in or over the area when an arriving aircraft is between the ILS FAF and the airport, except:

(a) A preceding arriving aircraft on the same or another runway that passes over or through the area while landing or exiting the runway.

(b) A preceding departing aircraft or missed approach on the same or another runway that passes through or over the area.



3-84c(1) Illustration

(2) In addition to (1) above, when conditions are reported ceiling less than 200 feet and/or RVR 2,000 or less *(USAF:* ½ *mile if no RVR)*, do not authorize vehicle or aircraft operations in or over the area when an arriving aircraft is inside the ILS MM *(USAF:* 1 NM from TD if no MM).

d. Glide Slope/Localizer Critical Area Advisories — When conditions are such that vehicle/aircraft restrictions in/over the areas are not required and an arriving aircraft advises the tower it will operate "Coupled" or "Autoland" or uses a similar phrase, promptly issue an advisory if a vehicle/aircraft will be in/over an area when the arriving aircraft is inside the ILS MM *(USAF:* 1 NM from TD if no MM).

Phraseology:

LOCALIZER/GLIDE SLOPE SIGNAL NOT PROTECTED.

3-85 thru 3-89 RESERVED

Section 8. SPACING AND SEQUENCING

3-90 SEQUENCE/SPACING APPLICATION

Establish the sequence of arriving and departing aircraft by requiring them to adjust flight or ground operation as necessary to achieve proper spacing.

Phraseology:

CLEARED FOR TAKEOFF.

CLEARED FOR IMMEDIATE TAKEOFF.

CLEARED FOR IMMEDIATE TAKEOFF OR HOLD SHORT (traffic).

CLEARED FOR IMMEDIATE TAKEOFF OR TAXI OFF THE RUNWAY.

EXTEND DOWNWIND.

MAKE SHORT APPROACH.

USAF/USN: "MAKE SHORT APPROACH" (not applicable to USAF/USN fighter type aircraft.)

NUMBER (landing sequence number).

FOLLOW (description and location of traffic) *or, if traffic is utilizing another runway,* TRAFFIC IS (description and location) LANDING RUNWAY (number of runway being used).

CIRCLE THE AIRPORT

MAKE LEFT/RIGHT THREE-SIXTY/TWO SEVENTY.

GO AROUND.

CLEARED TO LAND.

CLEARED FOR:

TOUCH-AND-GO

or

STOP-AND-GO

or

LOW APPROACH

CLEARED FOR THE OPTION.

or

OPTION APPROVED

or

UNABLE OPTION, MAKE (specific type of approach/full stop landing)

or

UNABLE (type of option), OTHER OPTIONS APPROVED.

3-90 Note 1. — The "Cleared for the Option" procedure will permit an instructor pilot/flight examiner/pilot the option to make a touch-and-go, low approach, missed approach, stop-and-go, or full stop landing. This procedure will only be used at those locations with an operational control tower and will be subject to ATC approval.

3-90 Note 2. — For proper helicopter spacing, speed adjustments may be more practical than course changes.

3-90 Reference. — Expeditious Compliance, 2-5.

3-91 TOUCH-AND-GO OR STOP-AND-GO OR LOW APPROACH

Consider an aircraft cleared for touch-and-go, stop-and-go, or low approach as an arriving aircraft until it touches down (for touch-and-go), or makes a complete stop (for stop-and-go), or crosses the landing threshold (for low approach), and thereafter as a departing aircraft.

3-92 SIMULTANEOUS SAME DIRECTION OPERATION

Authorize simultaneous, same direction operations on parallel runways, on parallel landing strips, or on a runway and a parallel landing strip only when the following conditions are met:

a. Operations are conducted in VFR conditions unless visual separation is applied.

b. Two-way radio communication is maintained with the aircraft involved and pertinent traffic information is issued.

c. The distance between the runways or landing strips is in accordance with the minima in the Table (use the greater minimum if two categories are involved).

3-92c. Table. — Same Direction Distance Minima

	Minimum distance (feet) between parallel	
Aircraft category	*Runway centerlines*	*Edges of adjacent strips or runway and strip*
Lightweight, single-engine, propeller-driven	300	200
Twin-engine, propeller-driven	500	400
All others	700	600

3-93 SIMULTANEOUS OPPOSITE DIRECTION OPERATION

Authorize simultaneous opposite direction operations on parallel runways, on parallel landing strips, or on a runway and a parallel landing strip only when the following conditions are met:

a. Operations are conducted in VFR conditions.

b. Two-way radio communication is maintained with the aircraft involved and pertinent traffic information is issued.

Phraseology:

TRAFFIC (description) LANDING/TAKING OFF/ LOW APPROACH, OPPOSITE DIRECTION ON PARALLEL RUNWAY/LANDING STRIP.

c. The distance between the runways or landing strips is in accordance with the minima in the Table.

3-93c. Table. — Opposite Direction Distance Minima

	Minimum distance (feet) between parallel	
Time of Operation	*Runway centerlines*	*Edges of adjacent strips or runway and strip*
Between sunrise and sunset	1,400	1,400
Between sunset and sunrise	2,800	Not authorized

3-94 thru 3-99 RESERVED

Section 9. DEPARTURE PROCEDURES AND SEPARATION

3-100 DEPARTURE INFORMATION

Provide current departure information, as appropriate, to departing aircraft. Departure information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS code. Runway, wind, and altimeter may be omitted if a pilot uses the phrase "have numbers." Issue departure information by including the following:

3-100 Note. — Pilot use of "have numbers" does not indicate receipt of the ATIS broadcast.

a. Runway in use.

b. Surface wind from direct readout dials. At LLWAS locations, centerfield wind from the LLWAS display.

c. Altimeter setting.

3-100c Reference. — Altimeter Settings, Chapter 2, Section 7.

d. Time, when requested.

e. Issue the official ceiling and visibility to a departing aircraft before takeoff as follows:

(1) To a VFR aircraft when weather is below VFR conditions. *USAF:* To VFR aircraft when ceiling is below 1,500 feet or visibility is less than 3 miles.

(2) To an IFR aircraft when weather is below VFR conditions or highest takeoff minima, whichever is greater.

3-100e(2) Note. — Standard takeoff minimums are published in FAR 91.116(c). Takeoff minima other than standard are prescribed for specific airports/runways and published in a tabular form supplement to the NOS instrument approach procedures charts and appropriate FAA Forms 8260.

f. Taxi information, as necessary. You need not issue taxi route information unless the pilot specifically requests it.

g. *USAF NOT APPLICABLE.* An advisory to "check density altitude" when appropriate.

3-100g Reference. — Order 7210.3 — 285, Broadcast Density Altitude Advisory.

h. Issue braking action for the runway in use as received from pilots or the airport management when Braking Action Advisories are in effect.

3-100h Reference. — Braking Action Advisories, 3-34. Glossary (Braking Action Advisories).

3-101 DEPARTURE DELAY INFORMATION

USA/USAF/USN NOT APPLICABLE

When gate-hold procedures are in effect, issue the following departure delay information as appropriate:

3-101 Reference. — Order 7210.3 — 1232, Gate Hold Procedures.

a. Advise departing aircraft the time at which the pilot can expect to receive engine startup advisory.

Phraseology:

EXPECT ENGINE STARTUP (time).

b. Advise departing aircraft when to start engines.

Phraseology:

START ENGINES, ADVISE READY TO TAXI

c. If the pilot requests to hold in another delay absorbing area, the request shall be approved if space and traffic conditions permit.

3-102 DEPARTURE CONTROL INSTRUCTIONS

Inform departing IFR and Stage III VFR aircraft of the following:

a. Before takeoff —

(1) Issue the appropriate departure control frequency and beacon code. The departure control frequency may be omitted if a SID has been or will be assigned and the departure control frequency is published on the SID.

Phraseology:

DEPARTURE FREQUENCY WILL BE (frequency), SQUAWK (code).

(2) Inform all departing IFR military turboprop/turbojet aircraft (except transport and cargo types) to change to departure control frequency. If the local controller has departure frequency override, transmit urgent instructions on this frequency. If the override capability does not exist, transmit urgent instructions on the emergency frequency.

Phraseology:

CHANGE TO DEPARTURE.

b. After takeoff —

(1) When the aircraft is about ½ mile beyond the runway end, instruct civil aircraft and military transport and cargo types to contact departure control provided further communication with you is not required.

(2) Do not request departing military turboprop/turbojet aircraft (except transport and cargo types) to make radio frequency or radar beacon changes before the aircraft reaches 2,500 feet above the surface.

3-103 TAKEOFF POSITION HOLD

a. You may authorize an aircraft to taxi into takeoff position and hold when takeoff clearance cannot be issued because of traffic. Issue traffic information to any aircraft so authorized. You may omit traffic information when the traffic is another aircraft which has landed on or is taking off on the same runway and is clearly visible to the holding aircraft. Do not use conditional phrases such as "behind landing traffic" or "after the departing aircraft."

Phraseology:

TAXI INTO POSITION AND HOLD.

If required,

(traffic information).

b. *USAF/USN:* Do not authorize aircraft to taxi into takeoff position to hold simultaneously on intersecting runways.

c. *USAF/USN:* When issuing additional instructions or information to an aircraft holding in takeoff position, include instructions to continue holding or taxi off the runway, unless it is cleared for takeoff.

Phraseology:

CONTINUE HOLDING,

or

TAXI OFF THE RUNWAY.

d. *USAF:* When an aircraft is authorized to taxi into takeoff position to hold, inform it of the closest traffic within 6 miles on final approach to the same runway. If the approaching aircraft is on a different frequency, inform it of the aircraft taxiing into position.

3-103d Reference. — Altitude Restricted Low Approach, 3-131.

3-104 ANTICIPATING SEPARATION

Takeoff clearance need not be withheld until prescribed separation exists if there is a reasonable assurance it will exist when the aircraft starts takeoff roll.

3-105 TRAFFIC INFORMATION — DEPARTING AIRCRAFT

USAF

When an aircraft is cleared for takeoff, inform it of the closest traffic within 6 miles on final approach to the same runway. If the approaching aircraft is on a different frequency, inform it of the departing aircraft.

3-106 SAME RUNWAY SEPARATION

Separate a departing aircraft from a preceding departing or arriving aircraft using the same runway by ensuring that it does not begin takeoff roll until:

a. The other aircraft has departed and crossed the runway end or turned to avert any conflict. If you can determine distances by reference to suitable landmarks, the other aircraft need only be airborne if the following minimum distance exists between aircraft:

(1) When only Category I aircraft are involved — *3,000 feet.*

(2) When a Category I aircraft is preceded by a Category II aircraft — *3,000 feet.*

(3) When either the succeeding or both are Category II aircraft — *4,500 feet.*

(4) When either is a Category III aircraft — *6,000 feet.*

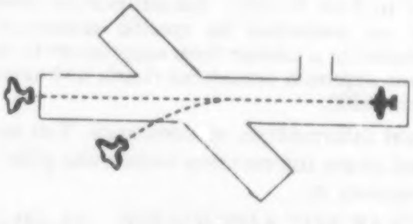
(5) When the succeeding aircraft is a helicopter, visual separation may be applied in lieu of using distance minima.

3-106a Note. — Aircraft Categories are as follows:

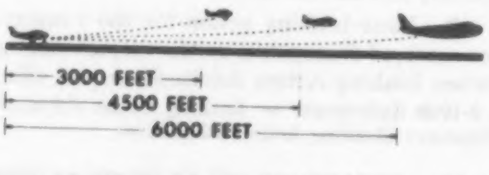
Category I — Light-weight, single-engine, personal-type propeller driven aircraft. (Does not include higher performance, single-engine aircraft such as the T-28.)

Category II — Light-weight, twin engine, propeller driven aircraft weighing 12,500 pounds or less, such as the Aero Commander, Twin Beechcraft, DeHaviland Dove, Twin Cessna. (Does not include such aircraft as a Lodestar, Learstar, or DC-3.)

Category III — All other aircraft such as the higher performance single-engine, large twin-engine, four engine, and turbojet aircraft.

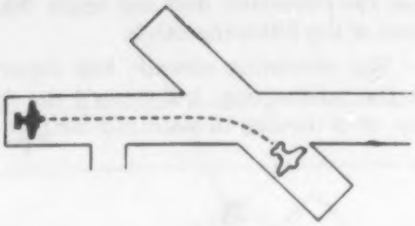


3-106a. Illustration 1



3-106a. Illustration 2

b. A preceding landing aircraft has taxied off the runway.



3-106b. Illustration

WAKE TURBULENCE APPLICATION

c. Do not issue clearances which imply or indicate approval of rolling takeoffs by heavy jet aircraft.

d. Do not issue clearances to a Category I or Category II aircraft to taxi into position and hold on the same runway behind a departing heavy jet aircraft to apply the necessary intervals.

3-106d Reference. — AC 90-23, Wake Turbulence.

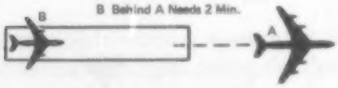
e. The minima in 5-72d may be applied in lieu of the 2-minute requirement in **f** below. When the 5-72d minima are applied, ensure that the appropriate radar separation exists at or prior to the time an aircraft becomes airborne when taking off behind a heavy jet.

3-106e Note. — The pilot may request additional separation; i.e., 2 minutes vs. 4 miles, but should make this request before taxiing on the runway.

f. Separate IFR/VFR aircraft taking off behind a heavy jet departure by *2 minutes,* when departing:

3-106f Note. — Takeoff clearance to the following aircraft should not be issued until *2 minutes* after the heavy jet begins takeoff roll.

(1) The same runway.



3-106f(1) Illustration

(2) A parallel runway separated by less than 2,500 feet.

g. Separate an aircraft from a heavy jet when operating on a runway with a displaced landing threshold if projected flight paths will cross — *2 minutes* when:

(1) A departure follows a heavy jet arrival.

(2) An arrival follows a heavy jet departure.

h. *USAF NOT APPLICABLE.* The *2 minute* minima need not be applied if the pilot of a departing IFR/VFR aircraft has initiated a request to deviate from the *2 minute* interval. In this case, issue a wake turbulence cautionary advisory before clearing the aircraft for takeoff.

i. Separate a Category I or II aircraft behind a nonheavy Category III aircraft taking off or making a low/missed approach when utilizing opposite direction takeoffs on the same runway by *3 minutes* unless a pilot has INITIATED a request to deviate from the *3-minute* interval. In the latter case, issue a wake turbulence advisory before clearing the aircraft for takeoff.

3-106i Note. — A request for takeoff does not initiate a waiver request; the request for takeoff must be accompanied by a request to deviate from the *3-minute* rule.

3-106i Reference. — Aircraft Categories, 3-106a Note.

j. Separate aircraft behind a heavy jet departing or making a low/missed approach when utilizing opposite direction takeoffs or landings on the same or parallel runways separated by less than 2,500 feet — *3 minutes.*

k. Inform an aircraft when it is necessary to hold in order to provide the required *3-minute* interval.

Phraseology:

HOLD FOR WAKE TURBULENCE.

3-107 INTERSECTION TAKEOFF

Handle intersection takeoffs as follows:

3-107 Reference. — Order 7210.3 — 209, Intersection Takeoffs.

a. You may initiate an intersection takeoff.

b. You may authorize an intersection takeoff if the pilot requests it.

c. Issue the measured distance from the intersection to the runway end to any pilot who requests it and to all military aircraft unless use of the intersection is covered in appropriate directives.

3-107c Note. — Exceptions are authorized where specific military aircraft routinely make intersection takeoffs and procedures are defined in appropriate directives. The authority exercising operational control of such aircraft ensures that all pilots are thoroughly familiar with these procedures, including the usable runway length from the applicable intersection.

Phraseology:

RUNWAY (runway number) INTERSECTION DEPARTURE.

If requested or required,

RUNWAY (runway number) INTERSECTION DEPARTURE, (remaining length) FEET AVAILABLE

WAKE TURBULENCE APPLICATION

d. Separate a Category I or II aircraft taking off from an intersection on the same runway (same or opposite direction takeoff) behind a preceding departing nonheavy Category III aircraft by ensuring that it does not start takeoff roll until at least *3 minutes* after Category III aircraft has taken off. Inform an aircraft when it is necessary to hold in order to provide the required 3-minute interval.

Phraseology:

HOLD FOR WAKE TURBULENCE.

e. The 3-minute interval is not required when:

(1) A pilot has INITIATED a request to deviate from that interval, or

3-107e(1) Note. — A request for takeoff does not initiate a waiver request; the request for takeoff must be accomplished by a request to deviate from the 3-minute interval.

(2) *USA/USAF NOT APPLICABLE.* The intersection is 500 feet or less from the departure point of the preceding aircraft and both aircraft are taking off in the same direction.

f. When applying the provisions of e:

(1) Issue a wake turbulence advisory before clearing the aircraft for takeoff.

(2) Do not clear the intersection departure for an immediate takeoff.

(3) When applying 107e(1) or 107e(2) above, issue a clearance to permit the trailing aircraft to deviate from course enough to avoid the flight path of the preceding nonheavy Category III departure.

(4) Separation requirements in accordance with 3-106a must also apply.

3-107e and f Reference. — Aircraft Categories, 3-106a. NOTE.

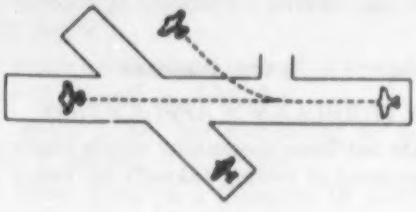
g. Separate an aircraft taking off from an intersection on the same runway (same or opposite direction takeoff) and parallel runways separated by less than 2,500 feet, by ensuring that it does not start takeoff roll until at least *3 minutes* after a heavy jet has taken off.

h. *USAF:* Separate a nonheavy aircraft taking off on the same runway behind a preceding departing A-300, B-747, C-5A, DC-10, or L-1011 by ensuring that it does not start takeoff roll until at least *4 minutes* after the preceding heavy jet has taken off.

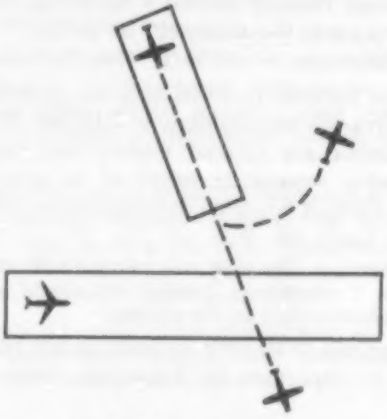
3-108 INTERSECTING RUNWAY SEPARATION

Separate departing aircraft from an aircraft using an intersecting runway, or nonintersecting runways when the flight paths intersect, by ensuring that the departure does not begin takeoff roll until one of the following exists:

a. The preceding aircraft has departed and passed the intersection, has crossed the departure runway, or is turning to avert any conflict.

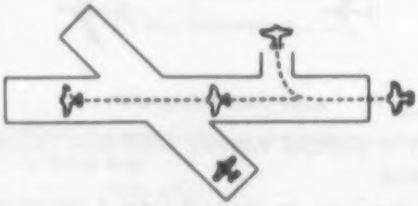


3-108a. Illustration 1

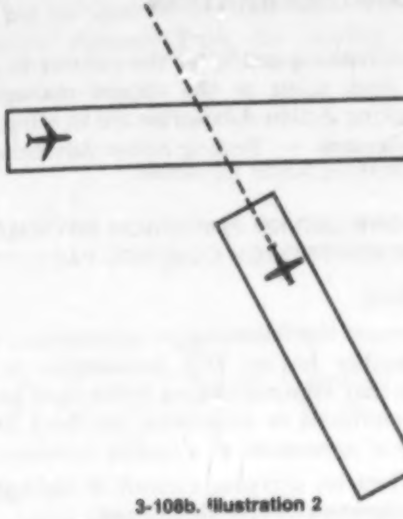


3-108a. Illustration 2

b. A preceding arriving aircraft has taxied off the landing runway, completed the landing roll and will hold short of the intersection, passed the intersection, or has crossed over the departure runway.



3-108b. Illustration 1



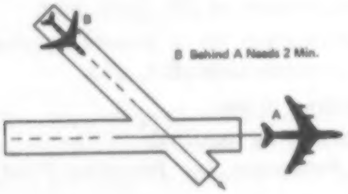
3-108b. Illustration 2

WAKE TURBULENCE APPLICATION

c. Separate IFR/VFR aircraft taking off behind a heavy jet departure by *2 minutes*, when departing:

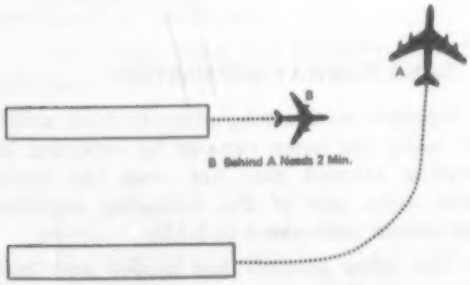
3-108c Note. — Takeoff clearance to the following aircraft should not be issued until 2 minutes after the heavy jet begins takeoff roll.

(1) Crossing runways if projected flight paths will cross.



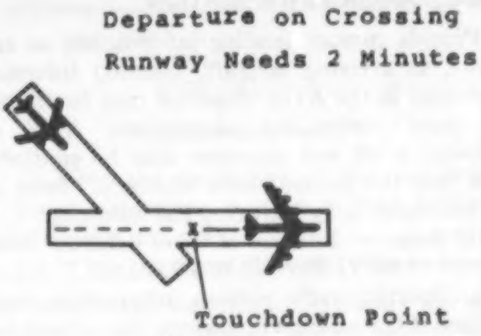
3-108c(1) Illustration

(2) A parallel runway separated by 2,500 feet or more if projected flight paths will cross.



3-108c(2) Illustration

d. Separate IFR/VFR aircraft departing behind a landing heavy jet on a crossing runway if the departure will fly through the airborne path of the arrival — *2 minutes.*



3-108d. Illustration

e. *USAF NOT APPLICABLE.* The *2-minute* minima need not be applied if the pilot of a departing IFR/VFR aircraft has initiated a request to deviate from the *2-minute* interval. In this case, issue a wake turbulence cautionary advisory before clearing the aircraft for takeoff.

3-109 TAKEOFF CLEARANCE

a. Issue takeoff clearance.

Phraseology:

CLEARED FOR TAKEOFF.

3-109a Note. — Turbine-powered aircraft may be considered ready for takeoff when they reach the runway, unless they advise otherwise.

3-109a Reference. — Departure Terminology, 4-20.

b. *USA/USAF/USN:* Issue surface wind and takeoff clearance to aircraft.

Phraseology:

WIND (surface wind in direction and velocity).

CLEARED FOR TAKEOFF.

3-110 CANCELLATION OF TAKEOFF CLEARANCE

Cancel a previously issued clearance for takeoff and inform the pilot of the reason if circumstances require.

Phraseology:

CANCEL TAKEOFF CLEARANCE (reason).

3-111 thru 3-119 RESERVED

Section 10. ARRIVAL PROCEDURES AND SEPARATION

3-120 LANDING INFORMATION

Provide current landing information, as appropriate, to arriving aircraft. Landing information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS code. Runway, wind, and altimeter may be omitted if a pilot uses the phrase "have numbers." Issue landing information by including the following:

2-120 Note. — Pilot use of "have numbers" does not indicate receipt of the ATIS broadcast.

a. Specific traffic pattern information (may be omitted if the aircraft is to circle the airport to the left).

Phraseology:

ENTER LEFT/RIGHT BASE. STRAIGHT-IN. MAKE STRAIGHT-IN. STRAIGHT-IN APPROVED. RIGHT TRAFFIC. MAKE RIGHT TRAFFIC. RIGHT TRAFFIC APPROVED. CONTINUE.

b. Runway in use.

c. Surface wind

(1) Surface wind from direct readout dials, or

(2) At LLWAS locations, centerfield wind from the LLWAS display, or

(3) Surface wind information from the LLWAS remote sensors (field boundary), and

(4) When an aircraft is being controlled by a controller not having surface wind for the airport concerned, relay surface wind information to the controller.

d. Altimeter setting.

3120d Reference. — Chapter 2, Section 7.

e. Any supplementary information

f. Clearance to land.

g. Requests for additional position reports. Use prominent geographical fixes which can be easily recognized from the air, preferably those depicted on sectional charts. This does not preclude the use of the legs of the traffic pattern as reporting points.

3-120g Note. — At some locations, VFR checkpoints are depicted on Sectional Aeronautical and Terminal Area Charts. In selecting geographical fixes, depicted VFR checkpoints are preferred unless the pilot exhibits a familiarity with the local area.

h. Ceiling and visibility if either is below basic VFR minima *(USAF:* If below 1,500 feet or 3 miles).

i. Low level wind shear advisories when available.

3-120i Reference. — Low Level Wind Shear Advisories, 3-8.

j. Issue braking action for the runway in use as received from pilots or the airport management when Braking Action Advisories are in effect.

3-120j Reference. — Braking Action Advisories, 3-34. Glossary (Braking Action Advisories).

3-121 FORWARDING APPROACH INFORMATION BY NONAPPROACH CONTROL FACILITIES

TERMINAL

a. Forward the following, as appropriate, to the control facility having IFR jurisdiction in your area. You may eliminate those items that, because of local conditions or situations, are fully covered in a letter of agreement or a facility directive.

(1) When an arriving aircraft is sighted and, in your judgment, landing is assured.

3-121a(1) Note. — "Landing assured" serves to alert the facility having IFR jurisdiction that landing of a particular aircraft is imminent via a direct flight to the runway. This allows the control facility to initiate preapproach action (vectors for positioning, etc.) of a subsequent arrival. It in no way serves to relieve the control facility of its separation responsibility.

(2) When you clear an arriving aircraft for a visual approach.

3-121a(2) Reference. — Visual Approach, 7-30.

(3) Aircraft arriving time.

(4) Cancellation of IFR flight plan.

(5) Information on a missed approach, unreported, or overdue aircraft.

(6) Runway in use.

(7) Weather as required.

3-121a(7) Reference. — Reporting Weather Conditions, 2-105.

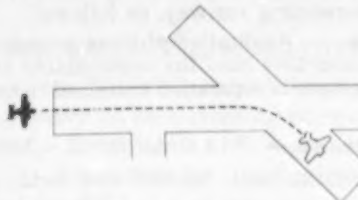
b. When the weather is below 1,000 feet or 3 miles *(USAF:* 1,500/3) or the highest circling minimums, whichever is greater, issue current weather to aircraft executing an instrument approach if it changes from that on the ATIS or that previously forwarded to the center/approach control.

3-122 SAME RUNWAY SEPARATION

a. Separate an arriving aircraft from another aircraft using the same runway by ensuring that the arriving aircraft does not cross the landing threshold until one of the following conditions exists or unless authorized in 3-131:

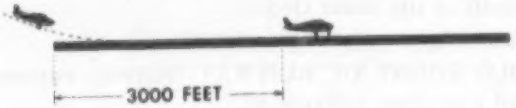
(1) The other aircraft has landed and taxied off the runway. Between sunrise and sunset, if you can determine distances by reference to suitable landmarks and the other aircraft has landed, it

need not be clear of the runway if the following minimum distance from the landing threshold exists:



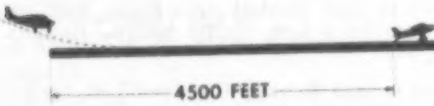
3-122a(1). Illustration

(a) When a Category I aircraft is landing behind a Category I or II — *3,000 feet.*



3-122a(1)(a) Illustration

(b) When a Category II aircraft is landing behind a Category I or II — *4,500 feet.*



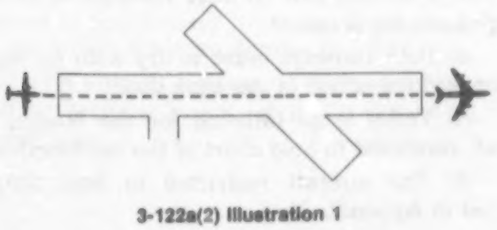
3-122a(1)(b) Illustration

(2) The other aircraft has departed and crossed the runway end. If you can determine distances by reference to suitable landmarks and the other aircraft is airborne, it need not have crossed the runway end if the following minimum distance from the landing threshold exists:

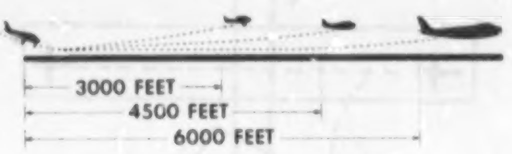
(a) Category I aircraft landing behind Category I or II — *3,000 feet.*

(b) Category II aircraft landing behind Category I or II — *4,500 feet.*

(c) When either is a category III aircraft — *6,000 feet.*



3-122a(2) Illustration 1



3-122a(2) Illustration 2

(3) When the succeeding aircraft is a helicopter, visual separation may be applied in lieu of using distance minima.

WAKE TURBULENCE APPLICATION

b. Issue wake turbulence cautionary advisories and the position, altitude if known, and direction of flight of the heavy jets to aircraft landing behind a departing/arriving heavy jet on the same or parallel runways separated by less than 2,500 feet.

3-122b Reference. — AC 90-23D, Pilot Responsibility, paragraph 12.

3-122b Example 1. —

"Cleared to land Runway Two Seven Left, caution wake turbulence, heavy Boeing 747 departing Runway Two Seven Right."

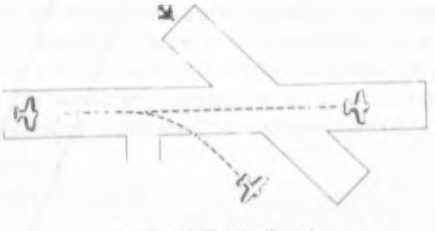
3-122b Example 2. —

"Number two to land, following a heavy Lockheed C5A on two-mile final. Caution wake turbulence."

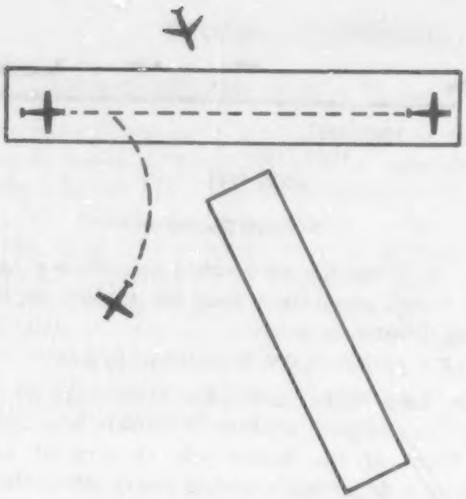
3-123 INTERSECTING RUNWAY SEPARATION

a. Separate an arriving aircraft using one runway from another aircraft using an intersecting runway or a nonintersecting runway when the flight paths intersect by ensuring that the arriving aircraft does not cross the landing threshold or flight path of the other aircraft until one of the following conditions exists:

(1) The preceding aircraft has departed and passed the intersection/flight path or is airborne and turning to avert any conflict.

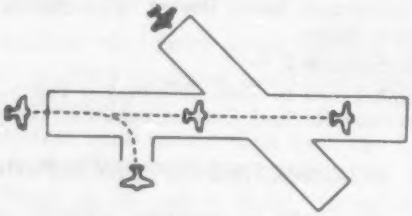


3-123a(1) Illustration 1

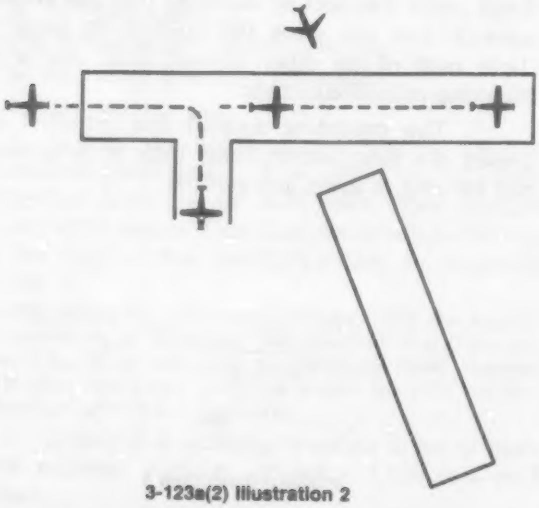


3-123a(1) Illustration 2

(2) A preceding arriving aircraft has taxied off the landing runway, completed landing roll and will hold short of the intersection/flight path, or has passed the intersection/flight path.



3-123a(2) Illustration 1



3-123a(2) Illustration 2

b. *USAF/USN NOT APPLICABLE.* Where approved by the air traffic manager and in accordance with a facility directive, you may authorize an aircraft to takeoff from one runway and another aircraft to land simultaneously on an intersecting runway or an aircraft to land on one runway and another aircraft to land simultaneously on an intersecting runway, as follows:

3-123b Note. — Application of these procedures does not relieve controllers from the responsibility of providing other appropriate separation contained in this handbook.

3-123b Reference. — FAA Order 7210.3 — 1226.

(1) A simultaneous takeoff and landing operation may be conducted only in VFR conditions between sunrise and sunset.

(2) Instruct the landing aircraft to hold short of the intersecting runway being used by the aircraft taking off. In the case of simultaneous landings and no operational benefit is lost, restrict the aircraft in the lesser Group.

Phraseology:

HOLD SHORT OF RUNWAY (runway number), (traffic or other information).

3-123b(2) Note. — Pilots who prefer to use the full length of the runway or a runway different from that specified are expected to advise ATC prior to landing.

(3) Issue traffic information to both aircraft involved and obtain an acknowledgement from each.

3-123b Example 1. —

"Cleared to land Runway One Eight, hold short of Runway One Four Left, traffic landing Runway One Four Left."

"Cleared to land Runway One Four Left, traffic landing Runway One Eight will hold short of the intersection."

3-123b Example 2. —

"Cleared to land Runway Three Six, hold short of Runway Three Three, traffic departing Runway Three Three."

"Traffic landing Runway Three Six will hold short of the intersection, cleared for takeoff."

(4) If requested by either aircraft, issue the measured distance from the landing threshold to the intersection.

3-123b(4) Example. —

"Distance from the landing threshold of Runway One Eight to the intersection of Runway One Four Left is six thousand feet."

(5) The conditions in (2), (3), and (4) shall be met in sufficient time for the pilots to take other action if desired and no later than the time landing clearance is issued.

(6) Both runways must be dry with no reports that braking action is less than good.

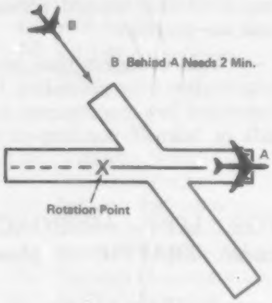
(7) There is no tailwind for the landing aircraft restricted to hold short of the intersection.

(8) The aircraft restricted to hold short is listed in Appendix B.

(9) STOL aircraft operations are in accordance with a letter of agreement with the aircraft operator/pilot, the aircraft is listed as a Group 1 in Appendix B, or the pilot confirms that it is a STOL aircraft.

WAKE TURBULENCE APPLICATION

c. Separate IFR/VFR aircraft landing behind a departing heavy jet on a crossing runway if the arrival will fly through the airborne path of the departure - *2 minutes* or the appropriate radar separation minima.

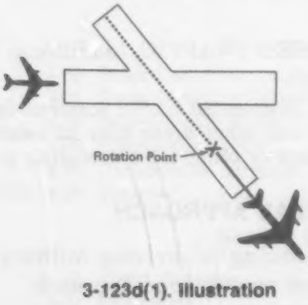


3-123c. Illustration

d. Issue wake turbulence cautionary advisories and the position, altitude if known, and direction of flight of the heavy jets to:

3-123d Reference. — AC 90-23D, Pilot Responsibility, paragraph 12.

(1) Aircraft landing on crossing runways behind a departing heavy jet if the arrival flight path will cross the takeoff path behind the heavy jet and behind the heavy jet rotation point.

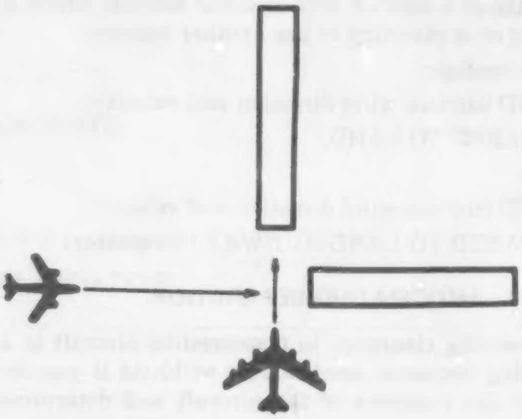


3-123d(1). Illustration

3-123d(1) Example. —

"Cleared to land Runway Niner. Caution wake turbulence, heavy C141 departing Runway One Five."

(2) VFR aircraft landing on a crossing runway behind an arriving heavy jet if the arrival flight path will cross.



3-123d(2) IllustrationS

3-123d(2) Example. —

"Cleared to land Runway Niner. Caution wake turbulence, heavy Boeing 747 land Runway Three Six."

3-124 WHEELS DOWN CHECK

USA/USAF/USN

Remind aircraft to check wheels down when it reaches an appropriate position in the pattern unless the pilot has previously reported wheels down.

Phraseology:

CHECK WHEELS DOWN.

3-124 Note. — The intent is solely to remind the pilot to lower the wheels — not to place responsibility on the controller.

3-125 WIND INFORMATION

USA/USAF/USN

Issue surface wind when clearing aircraft for touch-and-go, stop-and-go, low approach, or the option.

3-126 LANDING CLEARANCE

Issue landing clearance. Restate the landing runway whenever there is a possibility of a conflict with another aircraft which is using or planning to use another runway, or an instrument approach is being conducted to a closed runway.

Phraseology:

CLEARED TO LAND,

or

CLEARED TO LAND RUNWAY (designator).

USA/USAF/USN

Issue surface wind and landing clearance. Restate the landing runway whenever there is a pos-

sibility of a conflict with another aircraft which is using or is planning to use another runway.

Phraseology:

WIND (surface wind direction and velocity),
CLEARED TO LAND,

or

WIND (surface wind direction and velocity),
CLEARED TO LAND RUNWAY (designator).

3-127 ANTICIPATING SEPARATION

Landing clearance to a succeeding aircraft in a landing sequence need not be withheld if you observe the positions of the aircraft and determine that prescribed runway separation will exist when the aircraft cross the landing threshold. Issue traffic information to the succeeding aircraft.

3-127 Example. —

"Delta Forty-two cleared to land. Traffic is Eastern DC-9 over approach lights."

3-128 LANDING CLEARANCE WITHOUT VISUAL OBSERVATION

When an arriving aircraft reports at a position where he should be seen but has not been visually observed, advise the aircraft as a part of the landing clearance that it is not in sight and restate the landing runway.

Phraseology:

NOT IN SIGHT, CLEARED TO LAND RUNWAY (designator).

3-128 Note. — Aircraft observance on the BRITE radar display satisfies the visually observed requirement.

3-129 WITHHOLDING LANDING CLEARANCE

Do not withhold a landing clearance indefinitely even though it appears a violation of FAR has been committed. The apparent violation might be the result of an emergency situation. In any event, assist the pilot to the extent possible.

3-130 RUNWAY EXITING

When appropriate, instruct aircraft where to turnoff runway after landing.

Phraseology:

TURN LEFT/RIGHT (turning point),

or

IF ABLE, TURN LEFT/RIGHT (turning point.)

3-130 Note. — It is not intended that runway exiting or taxi instructions normally be issued to airborne aircraft prior to landing.

3-131 ALTITUDE RESTRICTED LOW APPROACH

A low approach with an altitude restriction of not less than 500 feet above the airport may be authorized except over an aircraft in takeoff position or a departure aircraft. Do not clear aircraft for restricted altitude low approaches over personnel unless airport authorities have advised these personnel that the approaches will be conducted. Advise the approaching aircraft of the location of applicable ground traffic, personnel, or equipment.

3-131 Note 1. — The 500 feet restriction is a minimum. Higher altitudes should be used when warranted. For example, 1,000 feet is more appropriate for heavy aircraft operating over unprotected personnel or small aircraft on or near the runway.

3-131 Note 2. — This authorization includes altitude restricted low approaches over preceding landing or taxiing aircraft. Restricted low approaches are not authorized over aircraft in takeoff position or departing aircraft.

Phraseology:

CLEARED FOR LOW APPROACH AT OR ABOVE (altitude). TRAFFIC IS (description and location).

3-131 Reference. — Vehicles/Equipment/Personnel on Runways, 3-5; Traffic Information, 3-6; Light Signals, 3-20; Timely Information, 3-32 Takeoff Position Hold, 3-103; Same Runway Separation, 3-122.

3-132 CLOSED TRAFFIC

Approve/disapprove pilot requests to remain in closed traffic for successive operations subject to local traffic conditions.

Phraseology:

LEFT/RIGHT (if required) CLOSED TRAFFIC APPROVED. REPORT (position if required),

or

UNABLE CLOSED TRAFFIC, (additional information as required).

3-132 Note. — Segregated traffic patterns for helicopters to runways and other areas may be established by letter of agreement or other local operating procedures.

3-133 OVERHEAD APPROACH

Issue the following to arriving military aircraft that will conduct an overhead approach:

a. Pattern altitude and direction of traffic. Omit either or both if standard or when you know the pilot is familiar with a nonstandard procedure.

Phraseology:

PATTERN ALTITUDE (altitude). RIGHT TURNS.

b. Request for report on initial approach.

Phraseology:

REPORT INITIAL.

TABLE OF CONTENTS

Page

Chapter 4. IFR

Section 1. NAVAID USE LIMITATIONS

4-1 Altitude and Distance Limitations 4-1
4-2 Exceptions 4-1
4-3 Crossing Altitude 4-1
4-4 VFR-On-Top 4-2
4-5 Fix Use 4-2
4-6—4-9 Reserved 4-2

Section 2. CLEARANCES

4-10 Clearance Items 4-3
4-11 Clearance Prefix 4-3
4-12 Delivery Instructions 4-3
4-13 Clearance Relay 4-3
4-14 Route or Altitude Amendments 4-3
4-15 Through Clearances 4-3
4-16 ALTRV Clearance 4-4
4-17 IFR-VFR and VFR-IFR Flights 4-4
4-18—4-19 Reserved 4-4

Section 3. DEPARTURE PROCEDURES

4-20 Departure Terminology 4-5
4-21 Departure Clearances 4-5
4-22 Abbreviated Departure Clearance 4-6
4-23 Departure Restrictions, Clearance Void Times, and Hold for Release 4-8
4-24 Delay Sequencing 4-8
4-25 Forward Departure Delay Information 4-8
4-26 Coordination with Receiving Facility 4-8
4-27 VFR Departure of IFR Departure 4-8
4-28 Forwarding Departure Times 4-9
4-29 Reserved 4-9

Section 4. ROUTE ASSIGNMENT

4-30 Route Use 4-10
4-31 Route Structure Transitions 4-10
4-32 Degree-Distance Route Definition USAF/USN 4-11
4-33 Alternative Routes 4-11
4-34 Uncontrolled Airspace 4-11
4-35—4-39 Reserved 4-11

Section 5. ALTITUDE ASSIGNMENT AND VERIFICATION

4-40 Flight Direction 4-12
4-41 Exceptions 4-12
4-42 Lowest Usable Flight Level 4-12
4-43 Adjusted Minimum Flight Level 4-12
4-44 Minimum En route Altitudes 4-13
4-45 Altitude Information 4-13
4-46 Anticipated Altitude Changes 4-14
4-47 Altitude Verification Non-Automatic Altitude Reporting 4-14
4-48—4-49 Reserved 4-15

Section 6. HOLDING AIRCRAFT

4-50 Clearance to Holding Fix 4-16

TABLE OF CONTENTS—Continued

Page

4-51 Clearance Beyond Fix 4-17
4-52 Delays 4-17
4-53 Holding Instructions 4-17
4-54 Visual Holding Points 4-17
4-55 Holding Flight Path Deviation 4-17
4-56 Unmonitored NAVAIDS 4-18
4-57 ILS Protection/Critical Areas 4-18
4-58—4-59 Reserved 4-18

Section 7. ARRIVAL PROCEDURES

4-60 Clearance Information 4-19
4-61 Advance Descent Clearance 4-19
4-62 Single Frequency Approaches (SFA) 4-19
4-63 Radio Frequency and Radar Beacon Changes for Military Aircraft 4-19
4-64 Military Turbojet En route Descent 4-20
4-65 Advance Approach Information 4-20
4-66 Arrival Information 4-20
4-67 Weather Information 4-21
4-68 Below Minima Report by Pilot 4-21
4-69 Transfer of Jurisdiction 4-21
4-70 Airport Conditions 4-21
4-71 Arrival Information by Approach Control Facilities 4-22
4-72 Approach Information by Approach Control Facilities 4-22
4-73 Switching ILS Runways 4-22
4-74—4-79 Reserved 4-23

Section 8. APPROACH CLEARANCE PROCEDURES

4-80 Approach Clearance 4-24
4-81 Clearance Limit 4-25
4-82 Relayed Approach Clearance 4-25
4-83 Altitude Assignment for Military High Altitude Instrument Approaches 4-25
4-84 Specifying Altitude 4-25
4-85 Circling Approach 4-25
4-86 Side-Step Maneuver 4-26
4-87 Communications Release 4-26
4-88 Missed Approach 4-26
4-89 Approach Information 4-26
4-90 Practice Approaches 4-26
4-91 Low Approach and Touch-and-Go 4-27

Chapter 4. IFR

Section 1. NAVAID USE LIMITATIONS

4-1 ALTITUDE AND DISTANCE LIMITATIONS

When specifying a route other than an established airway or route, do not exceed the limitations in the Table on any portion of the route which lies within controlled airspace.

4-1 Table. — Altitude and Distance Limitations

VOR/VORTAC/TACAN NAVAID'S

Normal Usable Altitudes and Radius Distances

Class	*Altitudes*	*Distance (miles)*
T	12,000 and below	25
L	Below 18,000	40
H	Below 18,000	40
H	14,500 — 17,999	*100
H	18,000 — FL 450	130
H	Above FL 450	100

*Applicable only within the conterminous 48 states.

L/MF Radio Beacon (RBN)

Usable Radius Distances for All Altitudes

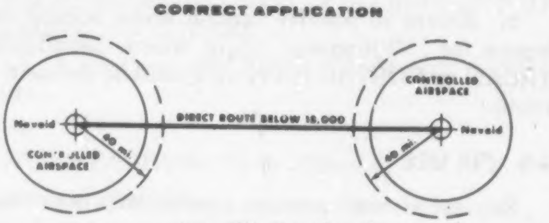
Class	*Power (watts)*	*Distance (miles)*
CL	Under 25	15
MH	Under 50	25
H	50 — 1,999	50
HH	2,000 or more	75

ILS

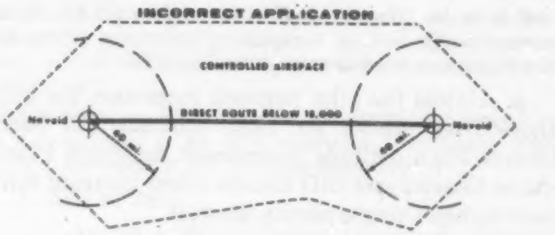
Usable Height and Distance*

Height above transmitter	*Distance (miles) from transmitter*
4,500	10 (for Glide Slope)
4,500	18 (for Localizer)

*Use current flight check height/altitude limitations if different from the above minima.


CORRECT APPLICATION
Navaid
40 mi.
CONTROLLED AIRSPACE
DIRECT ROUTE BELOW 18,000
CONTROLLED AIRSPACE
40 mi.
Navaid

4-1 Illustration 1


INCORRECT APPLICATION
CONTROLLED AIRSPACE
Navaid
40 mi.
DIRECT ROUTE BELOW 18,000
40 mi.
Navaid

4-1 Illustration 2

4-2 EXCEPTIONS

Altitude and distance limitations need not be applied when:

a. Routing is initiated by ATC and radar monitoring is provided.

b. Routing is requested by the pilot and radar flight following is provided for air traffic control purposes.

4-2b Note. — Paragraph 4-30i requires radar monitoring be provided at FL 450 and below to aircraft on random (impromptu) RNAV routes. Paragraph 5-70a requires radar separation be provided for these routes at FL450 and below.

c. Operational necessity requires and approval has been obtained from the Frequency Management and Flight Inspection Offices to exceed them.

d. Requested routing is via an MTR.

4-3 CROSSING ALTITUDE

Use an altitude consistent with the limitations of the aid when clearing an aircraft to cross or hold at a fix.

4-4 VFR-ON-TOP

Use a route not meeting service volume limitations only if an aircraft requests to operate "VFR-on-top" on this route.

4-4 Note. — Aircraft equipped with TACAN-only are expected to:

a. Define route of flight between TACAN or VORTAC NAVAID's in the same manner as VOR-equipped aircraft.

b. Except in positive control areas, submit requests for "VFR-on-top" flight where insufficient TACAN or VORTAC NAVAID's exist to define the route.

4-5 FIX USE

Request aircraft position reports only over fixes shown on charts used for the altitude being flown, except as follows:

4-5 Note. — Waypoints filed in random RNAV routes automatically become compulsory reporting points for the flight unless otherwise advised by ATC.

a. Unless the pilot requests otherwise, use only those fixes shown on High Altitude En route Charts, High Altitude Instrument Approach Procedures Charts, and SID Charts when clearing military turbojet single-piloted aircraft.

b. Except for military single-piloted turbojet aircraft, unpublished fixes may be used if the name of the NAVAID and, if appropriate, the radial/course and frequency are given to the pilot. An unpublished fix is defined as one approved and planned for publication which is not yet depicted on the charts or one which is used in accord with the following:

4-5b Reference. — Order 7130.3, Holding Pattern Criteria.

(1) Unpublished fixes are formed by the en route radial and either a DME distance from the same NAVAID or an intersecting radial from an off-route VOR/VORTAC/TACAN. DME shall be used in lieu of off-route radials, whenever possible.

(2) Except where known signal coverage restrictions exist, an unpublished fix may be used for ATC purposes if its location does not exceed NAVAID altitude and distance limitation, and when off-route radials are used, the angle of divergence meets the criteria prescribed below.

4-5b(2) Note. — Unpublished fixes should not negate the normal use of published intersections. Frequent routine use of an unpublished fix would justify establishing a fix.

4-5b(2) Reference. — Altitude and Distance Limitations, 4-1.

(3) Do not hold aircraft at unpublished fixes below the lowest assignable altitude dictated by terrain clearance for the appropriate holding pattern airspace area (template) regardless of the MEA for the route being flown.

(4) When the unpublished fix is located on an off-route radial and the radial providing course guidance, it shall be used consistent with the following divergence angles.

(a) When holding operations are involved, with respect to (b) and (c) below, the angle of divergence shall be at least 45 degrees.

(b) When both NAVAID's involved are located within 30 NM of the unpublished fix, the minimum divergence angle is 30 degrees.

(c) When the unpublished fix is located over 30 NM from the NAVAID generating the off-course radial, the minimum divergence angle shall increase 1 degree per nautical mile up to 45 NM; e.g., 45 NM would require 45 degrees.

(d) When the unpublished fix is located beyond 45 NM from the NAVAID generating the off-course radial, the minimum divergence angle shall increase ½ degree per nautical mile; e.g., 130 NM would require 88 degrees.

c. Fixes contained in the route description of MTR's are considered filed fixes.

d. TACAN-only aircraft (type suffix M, N, or P) possess TACAN with DME, but no VOR or LF navigation system capability. Assign fixes based on TACAN or VORTAC facilities only.

4-5d Note. — TACAN-only aircraft can never be held at the NAVAID, be it TACAN or VORTAC.

e. DME fixes shall not be established within the no-course signal zone of the NAVAID from which inbound holding course information would be derived.

4-6 thru 4-9 RESERVED

Section 3. DEPARTURE PROCEDURES

4-20 DEPARTURE TERMINOLOGY

Avoid using the term "takeoff" except to actually clear an aircraft for takeoff or to cancel a takeoff clearance. Use such terms as "depart," "departure," or "fly" in clearances when necessary.

4-21 DEPARTURE CLEARANCES

Include the following items in IFR departure clearances:

4-21 Note. — When considered necessary, controllers or pilots may initiate readbacks of a clearance. Some pilots may be required by company rule to do so.

a. Always include the airport of departure when issuing a departure clearance for relay to an aircraft by an FSS, dispatcher, etc.

b. Clearance Limit — Specify the destination airport when practicable, even though it is outside controlled airspace. Issue short range clearances as provided for in any procedures established for their use.

c. Departure Procedure — Specify direction of takeoff/turn or initial heading to be flown after takeoff as follows:

(1) Locations with Airport Traffic Control Service — Specify these items as necessary.

(2) Locations without Airport Traffic Control Service, but within a control zone — Specify these items if necessary. Obtain/solicit the pilot's concurrence concerning these items before issuing them in a clearance.

4-21c(2) Note. — Direction of takeoff and turn after takeoff can be obtained/solicited directly from the pilot, or relayed by an FSS, dispatcher, etc., as obtained/solicited from the pilot.

(3) At all other airports — Do not specify direction of takeoff/turn after takeoff. If necessary to specify an initial heading to be flown after takeoff, then issue the initial heading so as to apply only within controlled airspace.

d. When IFR departure procedures are published for a location and pilot compliance is necessary to insure separation, include the published departure procedure as part of the ATC clearance.

4-21d Note. — IFR takeoff minimums and departure procedures are prescribed for specific airports/runways and published in a tabular form supplement to the NOS Instrument Approach Procedure Charts and appropriate FAA Forms 8260. These procedures are identified on Approach Landing Charts with a symbol SYM.

e. Compatibility with a procedure issued may be verified by asking the pilot if items obtained/solicited will allow him to comply with local traffic pattern, terrain or obstruction avoidance.

Phraseology:

FLY RUNWAY HEADING.

DEPART (direction or runway).

TURN LEFT/RIGHT.

WHEN ENTERING CONTROLLED AIRSPACE (instruction), FLY HEADING (degrees) UNTIL REACHING (altitude, point or fix) BEFORE PROCEEDING ON COURSE.

FLY A (degree) BEARING FROM (fix) UNTIL (time),

or

UNTIL REACHING (fix or altitude)

and, if required

BEFORE PROCEEDING ON COURSE.

4-21e Examples. —

"Verify right turn after departure will allow compliance with local traffic pattern," or "Verify this clearance will allow compliance with terrain or obstruction avoidance."

4-21e Note. — If a published IFR departure procedure is not included in an ATC clearance, compliance with such a procedure is the pilot's prerogative.

f. SID routes:

(1) Assign a SID (including transition, if necessary). Assign a Preferential Departure Route (PDR) or the route filed by the pilot only when a SID is not established for the departure route to be flown or the pilot has indicated that he does not wish to use a SID.

Phraseology:

(SID name and number) DEPARTURE.

(SID name and number) DEPARTURE, (transition name) TRANSITION.

4-21f.(1) Examples. —

"Stroudsburg One Departure."

"Stroudsburg One Departure, Sparta Transition."

"Stroudsburg One RNAV Departure."

4-21f(1) Note. — If a pilot does not wish to use a SID issued in an ATC clearance or any other SID published for that location, he is expected to advise ATC.

(2) If it is necessary to assign a crossing altitude which differs from the SID altitude, repeat the changed altitude to the pilot for emphasis.

Phraseology:

(SID name) DEPARTURE, EXCEPT (revised altitude information). I SAY AGAIN (revised altitude information).

4-21f(2) Examples. —

"Stroudsburg One Departure, except cross Quaker at five thousand. I say again, cross Quaker at five thousand."

"Astoria Two RNAV Departure, except cross Astor waypoint at six thousand. I say again, cross Astor waypoint at six thousand."

(3) Specify altitudes when they are not included in the SID.

Phraseology:

(SID name) DEPARTURE. CROSS (fix) AT (altitude).

4-21f(3) Examples. —

"Stroudsburg One Departure. Cross Jersey intersection at four thousand. Cross Range intersection at six thousand."

"Engle Two RNAV Departure. Cross Pilim waypoint at or above five thousand. Cross Engle waypoint at or above seven thousand. Cross Gorge waypoint at niner thousand."

g. Route of flight — Specify one or more of the following:

(1) Airway, route, course, heading, arc, or vector.

(2) The routing a pilot can expect if any part of the route beyond a short range clearance limit differs from that filed.

Phraseology:

EXPECT FURTHER CLEARANCE VIA (airways, routes, or fixes.).

h. Altitude — Use one of the following, in the order of preference listed:

4-21h Note. — Turbojet aircraft equipped with afterburner engines may occasionally be expected to use afterburning during their climb to the en route altitude. When so advised by the pilot, the controller may be able to plan his traffic to accommodate the high performance climb and allow the pilot to climb to his planned altitude without restriction.

(1) Assign the altitude filed by the aircraft.

(2) Assign an altitude within the highest route stratum filed and as near as possible to the altitude filed by the aircraft. Interim altitude assignments shall not be used to satisfy this order of preference. They are covered in preference (3) below.

4-21h(2) Example. —

An aircraft has filed Flight Level 370. The nearest altitude within the filed route stratum that can be approved is Flight Level 330. The clearance will read: "Maintain flight level three three zero."

(3) Assign an interim altitude within the highest route stratum filed or as near as possible to the highest route stratum filed, and:

(a) Inform the aircraft when to expect clearance to an altitude consistent with (1) or (2) above unless instructions are contained in the specified SID.

(b) Comply with the provision of (1) or (2) above before the aircraft reaches the fix or prior to the time specified in the clearance.

4-21h(3) Note. — In the event of a two-way radio communication failure before receiving the en route altitude assignment within the highest route stratum filed, the aircraft will begin climb to the expected altitude at the time or fix specified in the initial clearance. The altitude to be expected, included in the clearance, is not applicable once the aircraft has proceeded beyond the fix or the time designated in the clearance has expired.

Phraseology:

EXPECT (the filed altitude or an altitude within the filed stratum as near as possible to the filed altitude) AT (time or fix).

4-21h(3) Examples. —

An aircraft has filed Flight Level 350. Flight Level 230 is immediately available and Flight Level 350 will be available at the Appleton zero five zero radial 35 mile fix. The clearance will read: "Maintain flight level two three zero. Expect flight level three five zero at Appleton zero five zero radial three five mile fix."

An aircraft has filed 9,000 feet. An interim altitude restriction is required because of facility procedures/requirements. Assign the interim altitude and advise the aircraft at what time/point he may expect his filed or final altitude. The clearance will read: "Maintain five thousand. Expect niner thousand one zero minutes after departure."

4-22 ABBREVIATED DEPARTURE CLEARANCE

a. Issue an abbreviated departure clearance if its use reduces verbiage and the following conditions are met:

4-22a Reference. — IFR-VFR and VFR-IFR flights, 4-17.

(1) The route of flight filed with ATC has not been changed by the pilot, company, operations officer, input operator, or in the stored flight plan program prior to departure.

4-22a(1) Note. — A pilot will not accept an abbreviated clearance if the route of flight filed with ATC has been changed by him or the company or the operations officer before departure. He is expected to inform the control facility on initial radio contact if he cannot accept the clearance. It is the responsibility of the company or operations officer to inform the pilot when they make a change.

(2) All ATC facilities concerned have sufficient route of flight information to exercise their control responsibilities.

4-22a.(2) Note. — The route of flight information to be provided may be covered in letters of agreement.

(3) When the flight will depart IFR, destination airport information is relayed between the facilities concerned prior to departure.

4-22a(3) Example 1. — A tower or flight service station relay of destination airport information to the center when requesting clearance. "Request clearance for United Four Sixty-one to O'Hare."

4-22a(3) Example 2. — A center relay to the tower or Flight Service Station when initiating a clearance, "Clearance for United Four Sixty-one to O'Hare."

4-22a(3) Note. — Pilots are expected to furnish the facility concerned with destination airport information on initial radio call-up. This will provide the information necessary for detecting any destination airport differences on facility relay.

(4) The assigned altitude, according to the provisions in **4-21h**, is stated in the clearance.

b. If it is necessary to modify a filed route of flight, in order to achieve computer acceptance due, for example, to incorrect fix or airway identification, the contraction "FRC," meaning "Full Route Clearance Necessary," will be added to the remarks. The contraction "FRC" must always be the first item of intra-center remarks. When the contraction "FRC" appears on a flight progress strip, the controller issuing the ATC clearance to the aircraft shall issue a full route clearance.

4-22b Note. — Changes such as those made to conform with traffic flows and preferred routings are only permitted to be made by the pilot (or his operations office) or the controller responsible for initiating the clearance to the aircraft.

c. Specify the destination airport in the clearance.

d. When no changes are required in the filed route, state the phrase, "Cleared to (destination) airport, (SID and SID transition, as appropriate); then, as filed." If a SID is not assigned, follow with "As filed." Specify the assigned altitude; and, if required, add any additional instructions or information.

Phraseology:

CLEARED TO (destination) AIRPORT;

and, as appropriate,

(SID name and number) DEPARTURE,

(transition name) TRANSITION; THEN,

AS FILED.

MAINTAIN (altitude);

and, if required,

(additional instructions or information).

If a SID is not assigned,

CLEARED TO (destination) AIRPORT AS FILED.

MAINTAIN (altitude);

and, if required,

(additional instructions or information).

4-22d Examples. —

"Cleared to Reynolds Airport; David Two RNAV Departure, Kingham Transition; then, as filed. Maintain niner thousand. Expect flight level four one zero, one zero minutes after departure."

"Cleared to Reynolds Airport as filed. Maintain niner thousand. Expect flight level four one zero, one zero minutes after departure."

4-22d Note 1. — SID's are excluded from "cleared as filed" procedures.

4-22d Note 2. — If a pilot does not wish to accept an ATC clearance to fly a SID, he is expected to advise ATC or state "No SID" in his flight plan remarks.

e. When a filed route will require revisions, the controller responsible for initiating the clearance to the aircraft shall either:

(1) Issue a full route clearance; or

(2) If it reduces verbage, state the phrase, "Cleared to (destination) airport, (SID and SID transition, as appropriate), then as filed, except . . .." Specify the necessary revision; then, the assigned altitude; and if required, add any additional instructions or information. If a SID is not assigned, state, "Cleared to (destination) airport as filed, except . . .." Specify the necessary revision, the assigned altitude; and if required, add any additional instructions or information.

Phraseology:

CLEARED TO (destination) AIRPORT;

and, as appropriate,

(SID name and number) DEPARTURE,

(transition name) TRANSITION; THEN,

AS FILED, EXCEPT CHANGE ROUTE

TO READ (amended route portion).

MAINTAIN (altitude);

and if required,

(additional instructions or information).

If a SID is not assigned,

CLEARED TO (destination) AIRPORT AS FILED, EXCEPT CHANGE ROUTE TO READ (amended route portion).

MAINTAIN (altitude);

and if required,

(additional instructions or information).

4-22e Examples. —

"Cleared to Reynolds Airport; South Boston One Departure; then, as filed, except change route to read, South Boston Victor Twenty Greensboro. Maintain eight thousand, report leaving four thousand."

"Cleared to Reynolds Airport as filed, except change route to read, South Boston Victor Twenty Greensboro. Maintain eight thousand, report leaving four thousand."

f. In a nonradar environment specify one, two, or more fixes, as necessary, to identify the initial route of flight.

4-22f Example. —

The filed route of flight is from Hutchins V10 Emporia, thence V10N and V77 to St. Joseph. The clearance will read:

"Cleared to Watson Airport as filed via Emporia, maintain seven thousand."

g. Do not apply these procedures when a pilot requests a detailed clearance or to military operations conducted within altitude reservations, stereo routes, operations above FL 600, and other military operations requiring special handling.

4-22g Note. — Departure clearance procedures and phraseology for military operations within approved altitude reservations, military operations above FL 600, and other military operations requiring special handling are contained in separate procedures in this handbook or in letters of agreement, as appropriate..

4-22g Reference. — ALTRV Clearances, 4-16; Military Operations Above FL 600, 8-30.

4-23 DEPARTURE RESTRICTIONS, CLEARANCE VOID TIMES, AND HOLD FOR RELEASE

a. Assign departure restrictions, clearance void times, or hold for release when necessary to separate departures from other traffic. The facility delivering a clearance to the aircraft containing a clearance void time shall issue a time check.

b. When issuing a "clearance void time" at airports not served by a control tower, provide alternate instructions to departing aircraft requiring the pilot to advise ATC of his intentions no later than 30 minutes after the clearance void time if not airborne.

Phraseology:

CLEARANCE VOID IF NOT OFF BY (clearance void time). IF NOT OFF BY (clearance void time), ADVISE (facility) NOT LATER THAN (time) OF INTENTIONS.

c. *Hold for release* is a term used between ATC facilities to advise the receiving controller to withhold delivering the clearance to the pilot until the controller initiating the clearance authorizes the release of the aircraft into the ATC system. When known, include an expect release time. *Hold for release* shall not be used between ATC and FSS or directly between controller and pilot.

Phraseology:

CLEARED TO (destination) AIRPORT AS FILED. MAINTAIN (altitude). HOLD FOR RELEASE. *When known, issue* EXPECT RELEASE (time);

and if required,

(additional instructions or information).

When releasing the aircraft, (aircraft identification) RELEASED:

and if required,

(additional instructions or information).

4-24 DELAY SEQUENCING

When aircraft elect to take delay on the ground before departure, issue departure clearances to them in the order in which the requests for clearance were originally made if practicable.

4-25 FORWARD DEPARTURE DELAY INFORMATION

Inform approach control facilities and/or towers of anticipated departure delays.

4-26 COORDINATION WITH RECEIVING FACILITY

a. Coordinate with the receiving facility before the departure of an aircraft if the departure point is less than 15 minutes flying time from the transferring facility's boundary unless an automatic transfer of data between automated systems will occur, in which case, the flying time requirement may be reduced to 5 minutes or replaced with a mileage from the boundary parameter when mutually agreeable to both facilities.

4-26a Note. — Agreements requiring additional time are encouraged between facilities that need earlier coordination. However, when agreements establish mandatory radar handoff procedures, coordination need only be effected in a timely manner prior to transfer of control.

4-26a Reference. — Radar Handoff Application, 5-60.

b. The actual departure time or a subsequent strip posting time shall be forwarded to the receiving facility unless assumed departure times are agreed upon and that time is within 3 minutes of the actual departure time.

4-27 VFR RELEASE OF IFR DEPARTURE

When an aircraft which has filed an IFR flight plan requests a VFR departure through a terminal facility, FSS, or air/ground communications station:

a. After obtaining, if necessary, approval from the facility/sector responsible for issuing the IFR clearance, you may authorize an IFR flight planned aircraft to depart VFR. Inform the pilot of the proper frequency and, if appropriate, where or when to contact the facility responsible for issuing the clearance.

b. If the facility/sector responsible or issuing the clearance is unable to issue a clearance, inform the pilot and suggest that the delay be taken on the ground. If the pilot insists upon taking off VFR and obtaining an IFR clearance in the air, inform the facility/sector holding the flight plan of the pilot's intentions and, if possible, the VFR departure time.

Phraseology:

VFR DEPARTURE AUTHORIZED. CONTACT (facility) ON (frequency) AT (location or time, if required) FOR CLEARANCE.

4-28 FORWARDING DEPARTURE TIMES

TERMINAL

Unless alternate procedures are prescribed in a letter of agreement or automatic departure messages are being transmitted between automated facilities, forward departure times to the facility from which you received the clearance and also the terminal departure controller when that position is involved in the departure sequence.

4-28 Note 1. — Letters of agreement prescribing assumed departure times or mandatory radar handoff procedures are alternatives for providing equivalent procedures.

4-28 Note 2. — The letters "DM" flashing in Field 4 of the Full Data Block signify unsuccessful transmission of an automatic departure message.

4-28 Reference. — Order 7210.3-1325, Automatic Acquisition/Termination Areas.

4-29 RESERVED

Section 4. ROUTE ASSIGNMENT

4-30 ROUTE USE

Clear aircraft via airways, route structures, random RNAV routes, and NAVAID's established for the altitude stratum in which the operation is to be conducted by one or more of the following:

4-30 Note. — Except for certain NAVAID's/routes used by scheduled air carriers or authorized for specific uses in the control of IFR aircraft, airways, routes, and NAVAID's established for use at specified altitudes are shown on U.S. Government charts or DOD FLIP charts.

4-30 Reference. — Minimum En route Altitudes, 4-44; Application of Vector, 5-90.

a. Designated airways and routes.

Phraseology:

VIA:

VICTOR (color) (airway number)(the word ROMEO when RNAV),

or

J (route number) (the word ROMEO when RNAV),

or

SUBSTITUTE (airway or jet route) FROM (fix) TO (fix),

or

IR (route number).

CROSS/JOIN VICTOR/(color) (airway number), (number of miles) MILES (direction) OF (fix).

b. Radials, courses, or direct to or from NAVAID's.

Phraseology:

DIRECT.

VIA:

(name of NAVAID) (specified) RADIAL/COURSE,

or

(fix) AND (fix),

or

RADIALS OF (airway or route) AND (airway or route).

c. DME arcs of VORTAC or TACAN aids.

d. Radials, courses, and headings of departure or arrival routes.

e. SID's/STAR's.

f. Vectors.

g. Fixes defined in terms of degree-distance from NAVAID's for special military operations.

h. Courses, bearings, quadrants, or radials within a radius of a NAVAID

Phraseology:

CLEARED TO FLY (general direction from NAVAID) OF (NAVAID name and type) BETWEEN (specified) COURSES TO/BEARINGS FROM/RADIALS (NAVAID name when a NDB) WITHIN (number of miles) MILE RADIUS,

or

CLEARED TO FLY (specified) QUADRANT OF (NAVAID name and type) WITHIN (number of miles) MILE RADIUS.

4-30h Examples. —

"Cleared to fly east of Allentown VORTAC between the zero four five and the one three five radials within four zero mile radius."

"Cleared to fly east of Crystal Lake radio beacon between the two two five and the three one five courses to Crystal Lake within three zero mile radius."

"Cleared to fly northeast quadrant of Philipsburg VORTAC within four zero mile radius."

i. Fixes defined in terms of degree-distance from NAVAID's or offset from published or established routes/airways at a specified distance and direction for random (impromptu) RNAV Routes. Provide radar monitoring at FL 450 and below.

Phraseology:

DIRECT TO THE (facility)(radial)(distance)FIX.

OFFSET(distance) RIGHT/LEFT OF (route).

4-30i Examples. —

"Direct to the Appleton three one zero radial two five mile fix."

"Offset eight miles right of Victor Six."

4-30i Reference. — Radar Separation, 5-70.

j. Waypoints defined in terms of latitude/longitude coordinates for random RNAV routes.

4-31 ROUTE STRUCTURE TRANSITIONS

To effect transition within or between route structure, clear an aircraft by one or more of the following methods, based on VOR, VORTAC, or TACAN NAVAID's (unless use of other NAVAID's is essential to aircraft operation or ATC efficiency):

a. Vector aircraft to or from radials or courses of the airway or route assigned.

b. Assign a SID/STAR.

c. Clear departing or arriving aircraft to climb or descend via radials or courses of the airway or jet route assigned.

d. Clear departing or arriving aircraft directly to or between the NAVAID's forming the airway or route assigned.

e. Clear aircraft to climb or descend via the airway or route on which flight will be conducted.

f. Clear aircraft to climb or descend on specified radials or courses of NAVAID's.

g. Provide radar monitor when transition to or from a designated or established RNAV route is made along random RNAV routes.

h. Clear RNAV aircraft transitioning to or between designated or established RNAV routes direct to a named waypoint on the new route.

4-32 DEGREE-DISTANCE ROUTE DEFINITION USAF/USN

EN ROUTE

Do not accept a flight plan whose route or route segments do not coincide with designated airways or jet routes or with a direct course between NAVAID's unless the route or route segments are defined as follows:

4-32 Note. — The following military operations are authorized to define portions of their routing in accordance with degree-distance route definition:

a. Airborne radar navigation, radar bomb scoring (RBS), and airborne missile programming conducted by USAF, USN, and RAF.

b. Celestial navigation conducted by USAF, USN, and RAF.

c. Target aircraft operating in conjunction with ADC interceptors, and ADC interceptors while en route to and from assigned airspace.

d. Missions conducted above FL 450.

e. USN fighter and attack aircraft operating in positive control airspace.

f. USN/USMC aircraft, TACAN equipped, operating within the Honolulu FIR/Hawaiian airways area.

g. USAF/USN/USMC aircraft flight planned to operate on MTR's.

a. The portion of the route which cannot be defined by a designated airway or jet route or a course between NAVAID's is defined in the flight plan as a point composed of the following:

(1) A location identifier.

(2) Azimuth in degrees magnetic.

(3) Distance in miles from the NAVAID.

4-32a Example. —

"MKE 030025."

b. The NAVAID's selected are VOR/VORDME/VORTAC/TACAN NAVAID's authorized for use at the altitude being flown and the distance from the NAVAID does not exceed the distance criteria for the NAVAID being used.

4-32b Note. — Military aircraft using degree-distance procedures conduct operations in accordance with the following:

a. The departure and arrival phases are flight-planned to conform with the routine flow of traffic when operating within 75 miles of the departure and destination airport unless prior coordination has been effected with the appropriate air traffic control facility. Routings are defined via appropriate routes or airways, a direct course between NAVAID's, or as otherwise required to conform to the normal flow of traffic.

b. Flight plans are filed at least 2 hours before the estimated time of departure when any portion of the requested routing is defined in accordance with degree-distance procedures.

c. Airborne radar navigation and RBS aircraft conduct navigation to, from, or between special route definition fixes by the use of airborne radar, and in most cases airborne radar is used to provide navigation when the route is defined as direct over NAVAID's or over established route systems.

d. When ADC target force aircraft file flight plans to operate in the high altitude structure, they define degree-distance fixes based on high altitude en route NAVAID's depicted on high altitude charts, regardless of the type of NAVAID used to navigate to these fixes.

e. ADC target force aircraft maintain communications watch on 243.0 MHz and the appropriate ADC or ATC frequency while operating within an intercept area.

c. The distance between the fixes used to define the route does not exceed:

(1) Below FL 180 — 80 miles, except that for celestial navigation flights the distance in (2) shall apply between fixes used to define the celestial navigation portion of the route of flight.

(2) FL 180 and above — 260 miles.

d. Consider special route definition fixes as compulsory reporting points, except that an aircraft may be authorized to omit reports over these fixes when traffic conditions permit.

4-33 ALTERNATIVE ROUTES

When any part of an airway or route is unusable because of NAVAID status, clear aircraft via one of the following alternative routes:

a. A route depicted on current U.S. Government charts/publications. Use the word "substitute" immediately preceding the alternative route in issuing the clearance.

b. A route defined by specifying NAVAID radials or courses.

c. A route defined as direct to or between NAVAID's.

d. Vectors.

4-34 UNCONTROLLED AIRSPACE

Include routes through uncontrolled airspace only when requested by the pilot.

4-34 Note 1. — Flight plans filed for random RNAV routes through uncontrolled airspace are considered a request by the pilot.

4-34 Note 2. — Flight plans containing MTR segments in/through uncontrolled airspace are considered a request by the pilot/s.

4-35 thru 4-39 RESERVED

Section 5. ALTITUDE ASSIGNMENT AND VERIFICATION

4-40 FLIGHT DIRECTION

Clear aircraft at altitudes according to the Table.

4-40 Table. — Altitude Assignment

Aircraft Operating	*On course degrees magnetic*	*Assign*
Below 3,000 feet above surface	Any course	Any altitude
Below FL 290	0 through 179	Odd cardinal altitudes or flight levels at intervals of 2,000 feet
	180 through 359	Even cardinal altitudes or flight levels at intervals of 2,000 feet
At or above FL 290	0 through 179	Odd cardinal flight levels at intervals of 4,000 feet beginning with FL 290
	180 through 359	Odd cardinal flight levels at intervals of 4,000 feet beginning with FL 310
Within an ALTRV	Any course	Any altitude or flight level

4-40 Examples. —

3,000, 5,000, FL 250, FL 270.

4,000, 6,000, FL 240, FL 260.

FL 290, FL 330, FL 370.

FL 310, FL 350, FL 390.

4-41 EXCEPTIONS

When traffic, meteorological conditions, or aircraft operational limitations prevent assignment of altitudes prescribed in paragraph 4-40, assign any cardinal altitude or flight level below FL 290 or any odd cardinal flight level at or above FL 290 without regard to direction of flight as follows:

4-41 Note. — *See 2-59 for control abbreviations and symbols to be used in conjunction with this paragraph.*

a. For traffic conditions, take this action only if one of the following conditions exists:

(1) Aircraft remain within a facility's area and prior approval is obtained from other affected positions or sectors or the operations are covered in a Facility Directive.

(2) Aircraft will proceed beyond the facility's area and specific operations and procedures permitting random altitude assignment are covered in a letter of agreement between the appropriate facilities.

(3) Military aircraft are operating on random routes and prior approval is obtained from the facility concerned.

b. For meteorological conditions, take this action only if you obtain prior approval from other affected positions or sectors within your facility and, if necessary, from the adjacent facility concerned.

c. For aircraft operational limitations, take this action only if the pilot informs you the available appropriate altitude exceeds the operational limitations of his aircraft and only after you obtain prior approval from other affected positions or sectors within your facility and, if necessary, from the adjacent facility concerned.

d. For mission requirements, take this action only when the aircraft is operating on an MTR.

4-42 LOWEST USABLE FLIGHT LEVEL

If a change in atmospheric pressure affects a usable flight level in your area of jurisdiction, use the Table to determine the lowest usable flight level to clear aircraft at or above 18,000 feet msl.

4-42 Table. — Lowest Usable FL

Altimeter Setting	*Lowest Usable FL*
29.92" or higher	180
29.91" to 28.92"	190
28.91" to 27.92"	200

4-43 ADJUSTED MINIMUM FLIGHT LEVEL

When the prescribed minimum altitude for IFR operations is at or above 18,000 feet MSL, and the atmospheric pressure is less than 29.92", add the appropriate adjustment factor from the Table to the flight level equivalent of the minimum altitude in feet to determine the adjusted minimum flight level.

4-43 Table. — Minimum FL Adjustment

Altimeter Setting	*Adjustment Factor*
29.92" or higher	None
29.91" to 29.42"	500 feet
29.41" to 28.92"	1,000 feet
28.91" to 28.42"	1,500 feet
28.41" to 27.92"	2,000 feet

4-44 MINIMUM EN ROUTE ALTITUDES

Except as provided in a and b below, assign altitudes at or above the MEA for the route segment being flown. When a lower MEA for subsequent segments of the route is applicable, issue the lower MEA only after the aircraft is over or past the Fix/NAVAID beyond which the lower MEA applies unless a crossing restriction at or above the higher MEA is issued.

a. An aircraft may be cleared below the MEA but not below the MOCA for the route segment being flown if the altitude assigned is at least 300 feet above the floor of controlled airspace and one of the following conditions are met:

4-44a Note. — Controllers must be aware that in the event of radio communications failure, a pilot will climb to the MEA for the route segment being flown.

(1) Nonradar procedures are used only within 22 miles of a VOR, VORTAC, or TACAN.

(2) Radar procedures are used only when an operational advantage is realized and the following actions are taken:

(a) Radar navigational guidance is provided until the aircraft is within 22 miles of the NAVAID, and

(b) Lost communications instructions are issued.

b. An aircraft may be cleared to operate on jet routes below the MEA (but not below the prescribed minimum altitude for IFR operations) or above the maximum authorized altitude if, in either case, radar service is provided.

4-44b Note. — Minimum en route and maximum authorized altitudes for certain jet route segments have been established above the floor of the jet route structure due to limitations on navigational signal coverage.

c. Where a higher altitude is required because of an MEA, the aircraft shall be cleared to begin climb to the higher MEA as follows:

(1) If no MCA is specified, prior to or immediately after passing the fix where the higher MEA is designated.

(2) If a MCA is specified, prior to the fix so as to cross the fix at or above the MCA.

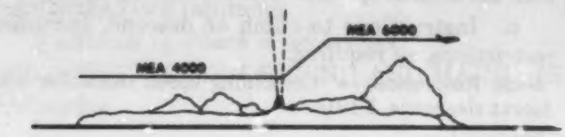


ILLUSTRATION 1.

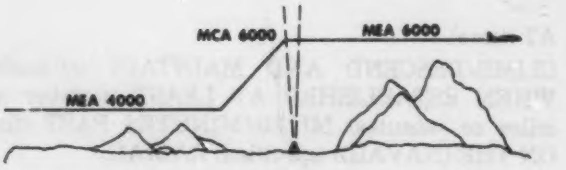


ILLUSTRATION 2.

d. Where MEA's have not been established, clear an aircraft at or above the minimum altitude for IFR operations prescribed by FAR 91.119.

4-45 ALTITUDE INFORMATION

When issuing altitude information, include the following items, as appropriate:

4-45 Reference. — Clearance Items, 4-10.

a. Altitude to maintain or cruise. When issuing cruise in conjunction with an airport clearance limit and an unpublished route will be used, issue an appropriate crossing altitude to ensure terrain clearance until the aircraft reaches a fix, point, or route where the altitude information is available to the pilot. When issuing a cruise clearance to an airport which does not have a published instrument approach, a cruise clearance without a crossing restriction may be issued.

Phraseology:

MAINTAIN/CRUISE (altitude). MAINTAIN (altitude) UNTIL (time), or PAST (fix), or (number of miles or minutes) MILES/MINUTES PAST (fix).

CROSS (fix, point) or INTERCEPT (route) AT OR ABOVE (altitude), CRUISE (altitude).

4-45a Note 1. — The crossing altitude must assure IFR obstruction clearance to the point where the aircraft is established on a segment of a published route or instrument approach procedure.

4-45a Note 2. — When an aircraft is issued a cruise clearance to an airport which does not have a published instrument approach procedure, it is not possible to satisfy the requirement for a crossing altitude that will ensure terrain clearance until the aircraft reaches a fix, point, or route where altitude information is available to the pilot. Under those conditions, a cruise clearance without a crossing restriction authorizes a pilot to determine the minimum IFR altitude as prescribed in FAR

READEX FICHE

91.119 and descend to it at pilot discretion if it is lower than the altitude specified in the cruise clearance.

b. Instructions to climb or descend, including restrictions, as required.

4-45b Reference. — Combining speed reduction with decent clearance, 5-101b.

Phraseology:

CLIMB/DESCEND AND MAINTAIN (altitude).

If required,

AFTER PASSING (fix),

or

AT (time).

CLIMB/DESCEND AND MAINTAIN (altitude) WHEN ESTABLISHED AT LEAST (number of miles or minutes) MILES/MINUTES PAST (fix) ON THE (NAVAID) (specified) RADIAL.

CLIMB/DESCEND TO REACH (altitude) AT (time or fix),

or

A POINT (number of miles) MILES (direction) OF (name of DME NAVAID).

c. Specified altitude over a specified fix.

Phraseology:

CROSS (fix) AT (altitude).

CROSS (fix) AT OR ABOVE/BELOW (altitude).

d. A specified altitude over a specified fix for that portion of a descent clearance where descent at pilot's discretion is permissible. At any other time it is practicable, authorize climb/descent at pilot's discretion.

Phraseology:

CLIMB/DESCEND AT PILOT'S DISCRETION.

4-45d Example 1. —

"United Four Seventeen, descend and maintain six thousand."

The pilot is expected to commence descent upon receipt of the clearance and to descend at the suggested rates specified in AIM, ATC Clearances/Separations, (Adherence to Clearance, Paragraph 270) until reaching the assigned altitude of 6,000 feet.

4-45d Example 2. —

"United Four Seventeen, descend at pilot's discretion, maintain six thousand."

The pilot is authorized to conduct descent within the context of the term "at pilot's discretion" as described in the AIM.

4-45d Example 3. —

"United Four Seventeen cross Lakeview V-O-R at or above flight level two zero zero, descend and maintain six thousand."

The pilot is authorized to conduct descent "at pilot's discretion", until reaching Lakeview VOR. He/she must comply with the clearance provision to cross the Lakeview VOR at or above FL 200, and after passing Lakeview VOR, he/she is expected to descend at the rates specified in the AIM until reaching the assigned altitude of 6,000 feet.

4-45d Example 4. —

"United Four Seventeen, cross Lakeview V-O-R at and maintain six thousand."

The pilot is authorized to conduct descent "at pilot's discretion," but must comply with the clearance provision to cross Lakeview VOR at 6,000 feet.

4-45d Example 5. —

"United Four Seventeen, descend now to flight level two seven zero, cross Lakeview V-O-R at or below one zero thousand, descend and maintain six thousand."

The pilot is expected to promptly execute and complete descent to FL 270 upon receipt of the clearance. After reaching FL 270, he/she is authorized to descend "at pilot's discretion" until reaching Lakeview VOR. He/she must comply with the clearance provision to cross Lakeview VOR at or below 10,000 feet. After Lakeview VOR, he/she is expected to descend at the rates specified in the AIM until reaching 6,000 feet.

4-45d Note. — A descent clearance which specifies a crossing altitude authorizes descent at pilot's discretion for that portion of the flight to which the crossing altitude restriction applies. Any other time that authorization to descend at pilot's discretion is intended it must be specifically stated by the controller.

4-45d Reference. — Glossary (Pilot's Discretion).

e. Altitude assignments involving more than one altitude.

Phraseology:

MAINTAIN (altitude) THROUGH (altitude).

4-46 ANTICIPATED ALTITUDE CHANGES

If practicable, inform an aircraft when to expect climb or descent clearance or to request altitude change from another facility.

Phraseology:

EXPECT CLIMB/DESCENT CLEARANCE IN (number of miles or minutes) MILES/MINUTES,

or

AT (fix). REQUEST ALTITUDE CHANGE FROM (name of facility).

If required,

AT (time, fix, or altitude).

4-47 ALTITUDE VERIFICATION — NON-AUTOMATIC ALTITUDE REPORTING

a. Request a pilot to verify altitude on initial contact and when position reports are received, unless:

(1) The pilot states his altitude at the time, or

(2) You assign a new altitude to a climbing or descending aircraft, or

(3) *TERMINAL:* The aircraft was intrafacility transferred to your control.

Phraseology:

In level flight situations

VERIFY AT (altitude).

In climbing/descending situations

VERIFY ASSIGNED ALTITUDE (altitude).

b. *USAF/USA:* Reconfirm all pilot altitude readbacks.

Phraseology:

If altitude readback is correct,

AFFIRMATIVE (altitude).

If altitude readback is not correct,

NEGATIVE. CLIMB/DESCEND AND MAINTAIN (Altitude),

or

NEGATIVE. MAINTAIN (altitude).

4-48 thru 4-49 RESERVED

Section 6. HOLDING AIRCRAFT

4-50 CLEARANCE TO HOLDING FIX

When it is necessary to clear an aircraft to a fix other than the destination airport, issue the following:

a. Clearance limit (if any part of the route beyond a clearance limit differs from the last routing cleared, issue the route the pilot can expect beyond the clearance limit).

Phraseology:

EXPECT FURTHER CLEARANCE VIA (routing).

4-50a Example. —

"Expect further clearance via direct Stillwater V-O-R, Victor Two Twenty-six Snapy Intersection, direct Newark,"

b. Holding instructions.

(1) Holding instructions may be eliminated when you inform the pilot that no delay is expected.

(2) When the pattern is charted, you may omit all holding instructions except the charted holding direction and the statement "as published." Always issue complete holding instructions when the pilot requests them.

4-50b(2) Note. — The most generally used holding patterns are depicted on U.S. Government or commercially produced low/high altitude en route, area, and STAR charts.

Phraseology:

CLEARED TO (fix), HOLD (direction), AS PUBLISHED,

or

CLEARED TO (fix), NO DELAY EXPECTED.

c. EFC. Do not specify this item if no delay is expected.

(1) When additional holding is expected at any other fix in your facility's area, state the fix and your best estimate of the additional delay. When more than one fix is involved, state the total additional en route delay (omit specific fixes).

4-50c(1) Note. — Additional delay information is not used to determine pilot action in the event of two-way communications failure. Pilots are expected to predicate their actions solely on the provisions of FAR 91.127.

Phraseology:

EXPECT FURTHER CLEARANCE (time).

and, if required,

ANTICIPATE ADDITIONAL (time in minutes/hours) MINUTE/HOUR DELAY AT (fix),

or

ANTICIPATE ADDITIONAL (time in minutes/hours) MINUTE/HOUR EN ROUTE DELAY.

4-50c(1) Examples. —

"Expect further clearance one niner two zero, anticipate additional three zero minute delay at Sweet."

"Expect further clearance one five one zero, anticipate additional three zero minute en route delay."

(2) When additional holding is expected in an approach control area, state the total additional terminal delay.

Phraseology:

EXPECT FURTHER CLEARANCE (time),

and, if required,

ANTICIPATE ADDITIONAL (time in minutes/hours) MINUTE/HOUR TERMINAL DELAY.

(3) *TERMINAL:* When terminal delays exist or are expected, inform the appropriate center or approach control facility so that the information can be forwarded to arrival aircraft.

(4) When delay is expected, issue items 4-50a, b, and c at least 5 minutes before the aircraft is estimated to reach the clearance limit. If the traffic situation requires holding an aircraft that is less than 5 minutes from the holding fix, issue these items immediately.

4-50c(4) Note 1. — The AIM indicates that pilots should start speed reduction when 3 minutes or less from the holding fix. The additional 2 minutes contained in the 5-minute requirement are necessary to compensate for different pilot/controller ETAs at the holding fix, minor differences in clock times, and provision for sufficient planning and reaction times.

4-50c(4) Note 2. — When holding is necessary, the phrase "delay indefinite" should be used when an accurate estimate of the delay time and the reason for the delay cannot immediately be determined; i.e., disabled aircraft on the runway, terminal or center sector saturation, weather below landing minimums, etc. In any event, every attempt should be made to provide the pilot with the best possible estimate of his delay time and the reason for the delay. Controllers/supervisors should consult, as appropriate, with personnel (other sectors, weather forecasters, the airport management, other facilities, etc.) who can best provide this information.

Phraseology:

DELAY INDEFINITE, (reason, if known), EXPECT FURTHER CLEARANCE (time). (After determining the reason for the delay, advise the pilot as soon as possible.)

4-50 Examples. —

"Cleared to Drewe, hold west, as published, expect further clearance via direct Sidney V-O-R one three one five, anticipate additional two zero minute delay at Woody."

"Cleared to Aston, hold west on Victor Two Twenty-five, seven mile leg, left turns, expect further clearance one niner two zero, anticipate additional one five minute terminal delay."

"Cleared to Wayne, no delay expected."

"Cleared to Wally, hold north, as published, delay indefinite, snow removal in progress, expect further clearance one one three zero.

4-51 CLEARANCE BEYOND FIX

a. If no delay is expected, issue a clearance beyond the clearance limit as soon as possible and, whenever possible, at least 5 minutes before the aircraft reaches the fix.

b. Include the following items when issuing clearance beyond a clearance limit:

(1) Clearance limit or approach clearance.

(2) Route of flight. Specify one of the following:

(a) Complete details of the route (airway, route, course, fix(es), heading, arc, or vector).

(b) The phrase "via last routing cleared." Use this phrase only when the most recently issued routing to the new clearance limit is valid and verbiage will be reduced.

Phraseology:

VIA LAST ROUTING CLEARED.

(3) Assigned altitude if different from present altitude.

4-51 Note. — Except in the event of a two-way communications failure, when a clearance beyond a fix has not been received, pilots are expected to hold as depicted on U.S. Government or commercially produced (meeting FAA requirements) low/high altitude en route and area or STAR charts. If no holding pattern is charted and holding instructions have not been issued, pilots should ask ATC for holding instructions prior to reaching the fix. If a pilot is unable to obtain holding instructions prior to reaching the fix, he is expected to hold in a standard pattern on the course on which he approached the fix and request further clearance as soon as possible.

4-52 DELAYS

a. Advise your supervisor or flow controller as soon as possible when you delay or expect to delay aircraft.

b. When arrival delays reach or are anticipated to reach 30 minutes, take the following action:

(1) *EN ROUTE:* The center responsible for transferring control to an approach control facility or, for a nonapproach control destination, the center in whose area the aircraft will land shall issue total delay information as soon as possible after the aircraft enters the center's area. Whenever possible, the delay information shall be issued by the first center controller to communicate with the aircraft.

(2) *TERMINAL:* When tower en route control service is being provided, the approach control facility whose area contains the destination airport shall issue total delay information as soon as possible after the aircraft enters its approach control area. Whenever possible, the delay information shall be issued by the first terminal controller to communicate with the aircraft.

(3) Unless a pilot requests delay information, the actions specified in (1) and (2) above may be omitted when total delay information is available to pilots via ATIS.

Phraseology:

(Airport) ARRIVAL DELAYS (time in minutes/hours).

4-53 HOLDING INSTRUCTIONS

When necessary to issue holding instructions, specify:

a. Direction of holding from the fix.

b. Holding fix.

4-53b Note. — The holding fix may be omitted if included at the beginning of the transmission as the clearance limit.

c. Radial, course, bearing, airway, or route on which the aircraft is to hold.

d. Leg length in miles if DME or RNAV is to be used. Specify leg length in minutes if the pilot requests or you consider it necessary.

e. Direction of holding pattern turns only if left turns are to be made, the pilot requests, or you consider it necessary.

Phraseology:

HOLD (direction) OF (fix) ON (specified radial, course, bearing, airway, or route).

If leg length is specified,

(Number of minutes/miles) MINUTE/MILE LEG.

If direction of turn is specified,

LEFT/RIGHT TURNS.

4-54 VISUAL HOLDING POINTS

You may use as a holding fix a location which the pilot can determine by visual reference to the surface if he is familiar with it.

Phraseology:

HOLD AT (location) UNTIL (time or other condition).

4-54 Reference. — Visual Holding of VFR Aircraft, 7-4.

4-55 HOLDING FLIGHT PATH DEVIATION

Approve a pilot's request to deviate from the prescribed holding flight path if traffic conditions permit.

4-56 UNMONITORED NAVAIDS

Separate an aircraft holding at a fan marker or an unmonitored NAVAID from any other aircraft occupying the course which the holding aircraft will follow if it does not receive signals from the marker or NAVAID.

4-57 ILS PROTECTION/CRITICAL AREAS

When conditions are less than reported ceiling 800 feet and/or visibility 2 miles, do not authorize aircraft to hold below 5,000 feet inbound toward the airport on or within 1 statute mile of the localizer between the ILS FAF and the airport. *USAF:* Holding restriction applies only when an arriving aircraft is between the ILS FAF and the runway.

4-57a Reference. — Order 7130.3, paragraph 54 and Figure 20.

4-58 thru 4-59 RESERVED

Section 7. ARRIVAL PROCEDURES

4-60 CLEARANCE INFORMATION

Clear an arriving aircraft to a clearance limit by specifying the following:

a. Name of fix or airport.

b. Route of flight including a STAR and STAR Transition, if appropriate. Assign a STAR and STAR Transition to any civil aircraft in lieu of other routes; e.g., airways or Preferential Arrival Routes, when the routings are the same. The clearance shall include the name, the current number and the transition, if necessary, of the STAR to be flown. Assign a STAR to military aircraft only when a STAR is filed or requested by the pilot.

Phraseology:

(STAR name and number) ARRIVAL.

(STAR name and number) ARRIVAL, (transition name) TRANSITION.

4-60b Examples. —

"Rosewood One Arrival."

"Rosewood One Arrival, Delta Transition."

4-60b Note. — If a civil pilot does not wish to use a STAR issued in an ATC clearance or any other STAR published for that location, he is expected to advise ATC.

c. Assigned altitude if different from present altitude or when a STAR/STAR Transition is issued.

4-60c Example. —

Bayview Three RNAV Arrival, Helen Transition, maintain flight level three three zero."

d. Issue holding instructions, EFC, and additional delay information as required.

e. Instructions regarding further communications as appropriate.

4-60e Reference. — Radio Communications Transfer, 2-17.

4-61 ADVANCE DESCENT CLEARANCE

EN ROUTE

Take the following action when exercising control of aircraft landing at an airport located in an adjacent center's control area near the common boundary:

a. Coordinate with the receiving facility for a lower altitude and issue a clearance to the aircraft as appropriate.

b. Initiate this action at a distance sufficient from destination to allow for normal descent and speed reduction.

4-62 SINGLE FREQUENCY APPROACHES (SFA)

TERMINAL

Where SFA procedures for military single-piloted turbojet aircraft on an IFR flight plan are contained in a letter of agreement, do not require a radio frequency change after the aircraft begins approach, or after initial contact during an en route descent, until a landing or low approach has been completed, except under the following conditions:

4-62 Reference. — Order 7610.4-1566, Single Frequency Approach. Glossary (Single-piloted aircraft).

a. During daylight hours while the aircraft is in VFR conditions.

b. On pilot request.

c. When pilot cancels IFR flight plan.

d. In an emergency situation.

e. When aircraft is cleared for visual approach.

4-63 RADIO FREQUENCY AND RADAR BEACON CHANGES FOR MILITARY AIRCRAFT

When military single-piloted turbojet aircraft will conduct an approach wholly or partly in IFR conditions or at night, take the following action:

4-63 Note. — It is known that the mental distraction and the inadvertent movement of aircraft controls resulting from the pilot's turning, reaching, or leaning to change frequencies can induce spatial disorientation (vertigo).

a. Avoid radio frequency and radar beacon changes to the maximum extent that communications capabilities and traffic will permit. However, when changes are required:

(1) Give instructions early enough to allow the change before the aircraft reaches the approach fix or handoff point.

(2) Keep frequency/radar beacon changes to a minimum below 2,500 feet above the surface.

(3) Avoid requiring frequency/radar beacon changes during the time the aircraft is making a turn.

b. When traffic volume requires, a frequency other than the one used by aircraft making approaches may be assigned for use in transferring control to the approach control facility.

TERMINAL

c. If practicable, use a frequency common to both the GCA unit and approach control to minimize frequency changes.

d. When a GCA unit is not able to communicate on a common frequency, a change to a GCA frequency may be authorized.

e. When a nonradar approach will be made, aircraft may be instructed to change to tower frequency when:

(1) The reported ceiling is at or above 1,500 feet and visibility is 5 statute miles or more.

(2) The aircraft reports able to proceed by visual reference to the surface.

(3) The aircraft request and is cleared for a contact approach.

(4) The aircraft is cleared for a visual approach.

f. Avoid making frequency/radar beacon changes after an aircraft begins a high altitude approach.

g. In the event of a missed approach, do not require a frequency/radar beacon change before the aircraft reaches the missed approach altitude, MEA, or MVA.

4-64 MILITARY TURBOJET EN ROUTE DESCENT

Provide military turbojet aircraft the same arrival procedures that are provided for nonmilitary turbojet aircraft except:

4-64 Note. — It is the responsibility of the pilot to request a high altitude approach if he does not want normal arrival handling.

a. An en route descent may be used in a nonradar environment; however, radar capability should exist which will permit the aircraft to be vectored to the final approach course of a published high altitude instrument approach procedure or PAR/ASR approach. Do not use this procedure if other than normal vectoring delays are anticipated.

b. Prior to issuance of a descent clearance below the highest initial approach fix altitude established for any high altitude instrument approach procedure for the destination airport inform the aircraft:

(1) Type of approach to expect.

4-64b(1) Example. —

"Expect V-O-R approach to runway three two."

(2) Radar vectors will be provided to the final approach course.

4-64b(2) Example. —

"Expect surveillance/precision approach to Runway One Seven; radar vectors to final approach course."

(3) Current weather whenever the ceiling is below 1,000 feet *(USAF:* 1,500 feet) or the highest circling minimum whichever is greater, or when the visibility is less than 3 miles.

4-64b(3) Example. —

"Expect ILS approach to Runway Eight; radar vectors to localizer course. Weather (reported weather)."

c. If ATIS is provided and the pilot advises he has received the current ATIS broadcast before the descent clearance in b. is issued, omit those items in b. that are contained in the broadcast.

d. To avoid requiring an aircraft to fly at low altitudes for an excessive distance, descent clearance should be issued at a point determined by adding 10 to the first two digits of the flight level.

4-64d Example. —

For FL 370, 3710=47 miles.

4-64d Note. — Turbojet en route descents are based on a rate of descent of 4,000 to 6,000 feet per minute.

e. Do not terminate the en route descent of an aircraft without the consent of the pilot except as required by radar outage or an emergency situation.

4-65 ADVANCE APPROACH INFORMATION

When an aircraft intends to land at an airport where approach control services are provided and two or more instrument approach procedures are published, the facility controlling the aircraft immediately before entry into the approach control area shall inform the aircraft of the type of approach to expect or that it will be vectored to the airport. Omit this information if ATIS is provided for the airport or if visibility is 3 miles or better and the ceiling is at or above the highest initial approach altitude established for any low altitude instrument approach procedure for the airport.

Phraseology:

EXPECT (type) APPROACH.

EXPECT VISUAL APPROACH.

4-66 ARRIVAL INFORMATION

EN ROUTE

a. Forward the following information to nonapproach control towers soon enough to permit adjustment of the traffic flow or to FSS's soon enough to provide airport advisory service:

(1) Aircraft identification.

(2) Type of aircraft.

(3) ETA.

(4) Type of instrument approach procedure the aircraft will execute.

4-66a Note. — Specific time requirements are usually stated in a Letter of Agreement.

b. Forward the following information to approach control facilities before transfer of control jurisdiction:

4-66b Note. — Transfer points are usually specified in a Letter of Agreement.

(1) Aircraft identification.

(2) Type of aircraft and appropriate suffix, if transponder, DME or TACAN-only equipped.

(3) ETA or actual time, and proposed or actual altitude over clearance limit. The ETA need not be given if the arrival information is being forwarded during a radar handoff.

(4) Clearance limit (when other than the destination airport) and EFC issued to the aircraft. Clearance limit may be omitted when provided for in a letter of agreement.

(5) Time, fix, or altitude when control responsibility is transferred to the approach control facility. This information may be omitted when provided for in a letter of agreement.

Phraseology:

(Identification), (type of aircraft), ESTIMATED/OVER (clearance limit, (time), (altitude), EFC (time).

If required,

YOUR CONTROL,

or

YOUR CONTROL AT (time, fix or altitude).

4-67 WEATHER INFORMATION

EN ROUTE

When an available official weather report indicates weather conditions are below a 1,000-foot *(USAF:* 1,500-foot) ceiling or below the highest circling minimum, whichever is higher, or less than three-miles visibility for the airport concerned, transmit the weather report and changes classified as special weather observations to an arriving aircraft prior to or as part of the approach clearance when:

a. It is transmitted directly to the pilot via center controller-to-pilot communications.

b. It is relayed through a communications station other than an air carrier company radio or through a nonapproach control facility. You may do this by telling the station or non-approach control facility to issue current weather.

4-68 BELOW MINIMA REPORT BY PILOT

If an arriving aircraft reports weather conditions are below his landing minima:

4-68 Note. — Determination that existing weather/visibility is adequate for approach/landing is the responsibility of the pilot/aircraft operator.

a. Issue appropriate instructions to the aircraft to hold or proceed to another airport.

b. Adjust, as necessary, the position in the landing sequence of any other aircraft desiring to make approaches and issue approach clearances accordingly.

4-69 TRANSFER OF JURISDICTION

Transfer radio communications and control responsibility early enough to allow the receiving facility to clear an aircraft beyond the clearance limit before the aircraft reaches it.

4-70 AIRPORT CONDITIONS

a. *EN ROUTE:* Before issuing an approach clearance or en route descent, and subsequently as changes occur, inform an aircraft of any abnormal operation of approach and landing aids and of destination airport conditions that you know of which might restrict an approach or landing.

b. *TERMINAL:* On first contact or as soon as possible thereafter, and subsequently as changes occur, inform an aircraft of any abnormal operation of approach and landing aids and of destination airport conditions that you know of which might restrict an approach or landing. This information may be omitted if it is contained in the ATIS broadcast and the pilot states the appropriate ATIS code.

4-70b Reference. — Airport Conditions, Chapter 3, Section 3.

c. *TERMINAL:* Where RCR's are provided, transmit this information to USAF and ANG aircraft in accordance with one of the following. Issue the RCR to other aircraft upon pilot request.

(1) Before or when an approach clearance is issued.

(2) Before an en route descent clearance is issued.

(3) Prior to departure.

(4) As soon as possible after receipt of any subsequent changes in previously issued RCR information.

4-70c Note 1. — USAF has established RCR procedures for determining the average deceleration readings of runways under conditions of water, slush, ice, or snow. The use of RCR code is dependent upon the pilot having a "stopping capability chart" specifically applicable to his aircraft.

4-70c Note 2. — USAF offices furnish RCR information at airports serving USAF and ANG aircraft.

4-70c Reference. — Landing Area Conditions, 3-30.

4-71 ARRIVAL INFORMATION BY APPROACH CONTROL FACILITIES

TERMINAL

a. Forward the following information to nonapproach control towers soon enough to permit adjustment of the traffic flow or to FSSs soon enough to provide airport advisory service:

(1) Aircraft identification.

(2) Type of aircraft.

(3) ETA.

(4) Type of instrument approach procedure the aircraft will execute.

4-71a Note. — Specific time requirements are usually stated in a letter of agreement.

b. Forward the following information to the tower when the tower and TRACON are part of the same facility:

(1) Aircraft identification.

(2) Type aircraft, if required for separation purposes.

(3) Type of instrument approach procedure and/or runway, if differing from that in use.

4-71b Note. — The local controller has the responsibility to determine whether or not conditions are adequate for the use of ARTS data on the BRITE where a facility directive authorizes its use for the transfer of arrival data.

4-71b Reference. — Note 7210.3-1323, Use of ARTS Modify and Quick Look Functions.

c. Where the collocated or satellite tower has ARTS data displayed on its BRITE, the ARTS modify or quick look functions may be used to forward arrival data provided that a Facility Directive at the collocated tower, or a letter of agreement with the satellite tower, exists which outlines procedures for using ARTS for transferring this data.

d. Forward the following information to centers:

(1) Where two or more instrument approach procedures are published for the airport, the particular procedure which an aircraft can expect or that it will be vectored toward the airport for a visual approach.

(2) Highest altitude being used by the approach control facility at the holding fix.

(3) Average time interval between successive approaches.

(4) Arrival time of aircraft over the holding fix or, if control has been transferred to you before an aircraft has reached the fix, a statement or other indication acknowledging receipt of control responsibility.

(5) Revised EFC if different by 10 minutes or more from that issued by the center.

(6) Missed approaches if they affect center operations.

(7) Information relating to an unreported or overdue aircraft.

4-72 APPROACH INFORMATION BY APPROACH CONTROL FACILITIES

TERMINAL

a. Provide current approach information to arriving aircraft on first radio contact or as soon as possible thereafter. Approach information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS code; otherwise, issue approach information by including the following:

(1) Approach clearance or type approach to be expected if two or more approaches are published and the clearance limit does not indicate which will be used.

4-72a(1) Reference. — Advance Approach Information, 4-65

(2) Runway, if different from that to which the instrument approach is made.

(3) Surface wind.

(4) Ceiling and visibility if the ceiling at the airport of intended landing is reported below 1,000 feet (*USAF:* 1,500 feet) or below the highest circling minimum, whichever is greater, or the visibility is less than 3 miles.

(5) Altimeter setting for the airport of intended landing.

4-72a(5) Reference. — Altimeter Settings, Chapter 2, Section 7.

b. Issue any known changes classified as special weather observations as soon as possible. Special weather observations need not be issued after they are included in the ATIS broadcast and the pilot states the appropriate ATIS code.

c. Advise pilots when the ILS on the runway in use is not operational if that ILS is on the same frequency as an operational ILS serving another runway.

4-72c Example. —

"Expect Visual Approach Runway Two Five Right, Runway Two Five Right I-L-S not operational."

4-72c Reference. — FAR 91.87(d)(2).

4-73 SWITCHING ILS RUNWAYS

TERMINAL, USAF NOT APPLICABLE

When a change is made from one instrument landing system (ILS) to another at airports equipped with multiple systems which are not used simultaneously, do the following:

a. Coordinate with facilities which use fixes formed by reference to these ILS courses.

b. Broadcast on an appropriate frequency that a change is to be made.

Phraseology:

ATTENTION, I-L-S RUNWAY (runway number) WILL BE CHANGED TO I-L-S RUNWAY (runway number) ON (frequency) AT (time).

c. After the change is made, broadcast that it has been done.

Phraseology:

ATTENTION, I-L-S RUNWAY (runway number) ON (frequency) NOW IN OPERATION.

4-74 thru 4-79 RESERVED

Section 8. APPROACH CLEARANCE PROCEDURES

4-80 APPROACH CLEARANCE

a. Clear aircraft for "standard" or "special" instrument approach procedures only. To require an aircraft to execute a particular instrument approach procedure, specify in the approach clearance the name of the approach as published on the approach chart. Where more than one procedure is published on a single chart, and a specific procedure is to be flown, amend the approach clearance to specify execution of the specific approach to be flown. If only one instrument approach of a particular type is published, the approach need not be identified by the runway reference. An aircraft conducting an ILS approach when the glideslope is reported out of service shall be advised at the time an approach clearance is issued. Where adequate radar coverage exists, radar facilities may vector aircraft to the final approach course in accordance with paragraph 5-120.

Phraseology:

CLEARED FOR (type) APPROACH.

For a straight-in-approach — IFR

CLEARED FOR STRAIGHT-IN (type) APPROACH.

To authorize a pilot to execute his choice of instrument approach

CLEARED FOR APPROACH.

Where more than one procedure is published on a single chart and a specific procedure is to be flown,

CLEARED FOR (specific procedure to be flown) APPROACH.

To authorize a pilot to execute an ILS approach when the glideslope is out of service

CLEARED FOR (type) APPROACH, GLIDESLOPE UNUSABLE.

4-80a Examples. —

"Cleared for V-O-R Approach."

"Cleared for V-O-R Runway Three Six Approach."

"Cleared for I-L-S Approach."

"Cleared for Localizer Back Course Runway One Three Approach."

"Cleared for RNAV Runway Two Two Approach."

"Cleared for Branch One RNAV Arrival and RNAV Runway One Three Approach."

"Cleared for I-L-S Runway Three Six Approach, glideslope unusable."

4-80a Note 1. — Clearances authorizing instrument approaches are issued on the basis that, if visual contact with the ground is made before the approach is completed, the entire approach procedure will be followed unless the pilot receives approval for a contact approach, is cleared for a visual approach, or cancels his IFR flight plan.

4-80a Note 2. — Approach clearances are issued based on known traffic. The receipt of an approach clearance does not relieve the pilot of his responsibility to comply with applicable FARs and the notations on instrument approach charts which levy on the pilot the responsibility to comply with or act on an instruction; e.g., "Straight-in minima not authorized at night," "Procedure not authorized when glide slope not used," "Use of procedure limited to aircraft authorized to use airport," or "Procedure not authorized at night."

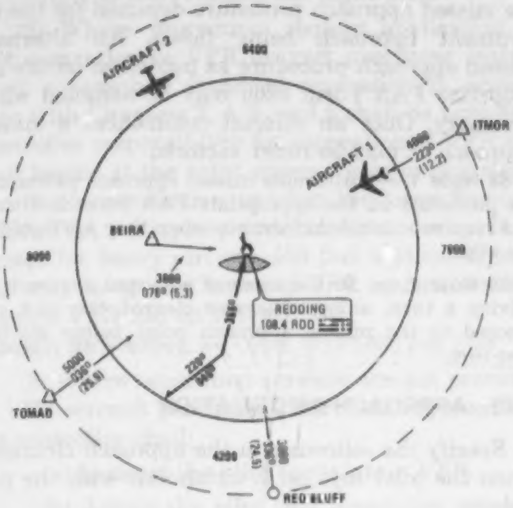
4-80a Note 3. — The name of the approach, as published, is used to identify the approach even though a component of the approach aid, other than the localizer on an ILS, is inoperative. Where more than one procedure is published on a single chart, the depicted runway or alphabetical suffixes apply to all procedures on that chart. For example, the Instrument Approach Procedures published on a chart as "Hi-VOR/DME or TACAN or ILS RWY 6L" would be stated as either Hi-VOR/DME Rwy 6L approach, or Hi-TACAN Rwy 6L approach, or Hi-ILS Rwy 6L approach.

4-80a Note 4. — FAR 91.116 requires a pilot to receive a clearance for a procedure turn when vectored to a final approach fix or position, conducting a timed approach, or when the procedure specifies "No PT."

4-80a Note 5. — An aircraft which has been cleared to a holding fix and prior to reaching that fix is issued a clearance for an approach, but not issued a revised routing; i.e., "proceed direct to. . . ." may be expected to proceed via the last assigned route, a transition if one exists, and then to the initial approach fix to commence the approach as depicted on the approach chart. If, by following the route of flight to the holding fix, the aircraft would overfly a transition fix or an initial approach fix to be used, the aircraft may be expected to proceed with the approach via the transition or initial approach fix, as appropriate; i.e., the aircraft would not be expected to overfly and return to those fixes.

b. For aircraft operating on unpublished routes, issue the approach clearance only after the aircraft is:

(1) Established on a segment of a published route or instrument approach procedure, or



4-80b ILLUSTRATION

4-80b(1) Example. —

Aircraft 1: The aircraft is established on a segment of a published route at 5,000 feet. "Cleared for V-O-R Runway Three Four Approach."

(2) Assigned an altitude to maintain until the aircraft is established on a segment of a published route or instrument approach procedure.

4-80b(2) Example. —

Aircraft 2: The aircraft is inbound to the VOR on an unpublished direct route at 7,000 feet. The minimum IFR altitude for IFR operations (FAR 91.119) along this flight path to the VOR is 5,000 feet. "Cross the Redding V-O-R at or above five thousand, cleared for V-O-R Runway Three Four Approach."

4-80b(2) Note 1. — The altitude assigned must assure IFR obstruction clearance from the point at which the approach clearance is issued until established on a segment of a published route or instrument approach procedure.

4-80b(2) Note 2. — If the altitude assignment is VFR-on-top, it is conceivable that the pilot may elect to remain high until arrival over the final approach fix which may require the pilot to circle to descend so as to cross the final approach fix at an altitude that would permit landing.

c. Except when applying radar procedures, timed, or visual approaches, clear an aircraft for an approach to an airport when:

(1) The preceding aircraft has landed or cancelled IFR flight plan, or

(2) The preceding aircraft is visible to the tower controller and sufficiently close to the airport that landing is imminent.

4-80c(2) Note. — This procedure should not be applied to circling approaches unless procedures exist that assure separation during the circling maneuver and in the event of an unanticipated missed approach of either aircraft.

4-80c(2) Reference. — Nonradar Separation, Chapter 6.

4-81 CLEARANCE LIMIT

Issue approach or other clearances as required, specifying the destination airport as the clearance limit if airport traffic control service is not provided, even though this is a repetition of the initial clearance.

4-82 RELAYED APPROACH CLEARANCE

TERMINAL

When an approach clearance is relayed through a communication station other than an air carrier company radio, include the weather report, if required. You may do this by telling the station to issue current weather.

4-83 ALTITUDE ASSIGNMENT FOR MILITARY HIGH ALTITUDE INSTRUMENT APPROACHES

Altitudes above those shown on the High Altitude Instrument Approach Procedures chart may be specified when required for separation.

4-83 Note. — To preclude the possibility of aircraft exceeding rate-of-descent or airspeed limitations, the maximum altitudes which may be assigned for any portion of the high altitude instrument approach procedure will be determined through coordination between the ATC facility concerned and the military authority which originated the high altitude instrument approach procedure.

4-83 Reference. — Military Turbojet En route Descent, 4-64.

4-84 SPECIFYING ALTITUDE

Specify in the approach clearance the altitude shown in the approach procedures when adherence to that altitude is required for separation. When vertical separation will be provided from other aircraft by pilot adherence to the prescribed maximum, minimum, or mandatory altitudes, the controller may omit specifying the altitude in the approach clearance.

4-84 Note. — Use NOS or DMAAC instrument approach procedures charts appropriate for the aircraft executing the approach.

4-85 CIRCLING APPROACH

TERMINAL

a. Include in the approach clearance instructions to circle to the runway in use if landing will be made on a runway other than that aligned with the direction of instrument approach. When the direction of the circling maneuver in relation to the airport/runway is required, state the direction (eight cardinal compass points) and specify a left or right base/downwind leg as appropriate.

Phraseology:

CIRCLE TO RUNWAY (runway number),

or

CIRCLE (direction using eight cardinal compass points) OF THE AIRPORT/RUNWAY FOR A LEFT/RIGHT BASE/DOWNWIND TO RUNWAY (runway number).

4-85a Note. — Where Standard Instrument Approach Procedures authorize circling approaches, they provide a basic minimum of 300 feet of obstacle clearance at MDA within the circling area considered. The dimensions of these areas, expressed in distances from the runways, vary for the different approach categories of aircraft. In some cases a SIAP may otherwise restrict circling approach maneuvers.

4-85a Reference. — Order 7210.3-215, Circling Approach Areas.

b. Do not issue clearances, such as "extend downwind leg," which might cause an aircraft to exceed the circling approach area distance from the runways within which required circling approach obstacle clearance is assured.

4-86 SIDE-STEP MANEUVER

TERMINAL

Side-Step Maneuver — When authorized by an instrument approach procedure, you may clear an aircraft for an approach to one runway and inform the aircraft that landing will be made on a parallel runway.

4-86 Example. —

"Cleared for I-L-S Runway Seven Left Approach. Side-step to Runway Seven Right."

4-86 Note. — Side-step maneuvers require higher weather minima/MDA. These higher minima/MDA are published on the instrument approach charts.

4-86 Reference. — Glossary (Side-Step Maneuver).

4-87 COMMUNICATIONS RELEASE

If an IFR aircraft intends to land at an airport not served by a tower or FSS, approve a change to the advisory service frequency when you no longer require direct communications.

Phraseology:

CHANGE TO ADVISORY FREQUENCY APPROVED.

4-87 Note. — Expeditious frequency change permits the aircraft to receive timely local airport traffic information in accordance with AC 90-42C.

4-88 MISSED APPROACH

Except in the case of a VFR aircraft practicing an instrument approach, an approach clearance automatically authorizes the aircraft to execute the missed approach procedure depicted for the instrument approach being flown. An alternate missed approach procedure as published on the appropriate FAA Form 8260 may be assigned when necessary. Once an aircraft commences a missed approach, it may be radar vectored.

4-88 Note 1. — Alternate missed approach procedures are published on the appropriate FAA Form 8260 only and require a detailed clearance when they are issued to the pilot.

4-88 Note 2. — In the event of a missed approach involving a turn, unless otherwise cleared, the pilot will proceed to the missed approach point before starting that turn

4-89 APPROACH INFORMATION

Specify the following in the approach clearance when the pilot says he is unfamiliar with the procedure:

a. Initial approach altitude.

b. Direction and distance from the holding fix within which procedure turn is to be completed.

c. Altitude at which the procedure turn is to be made.

d. Final approach course and altitude.

e. Missed approach procedures, if considered necessary.

Phraseology:

INITIAL APPROACH AT (altitude), PROCEDURE TURN AT (altitude) (number) MINUTES/MILES (direction), FINAL APPROACH ON (name of NAVAID) (specified) COURSE/RADIAL AT (altitude).

4-90 PRACTICE APPROACHES

Except for military aircraft operating at military airfields, ensure that neither VFR nor IFR practice approaches disrupt the flow of other arriving and departing IFR or VFR aircraft. Authorize, withdraw authorization, or refuse to authorize practice approaches as traffic conditions require. Normally, approaches in progress should not be terminated.

4-90 Note. — The priority afforded other aircraft over practice instrument approaches is not intended to be so rigidly applied that it causes grossly inefficient application of services.

a. Separation.

(1) IFR aircraft practicing instrument approaches shall be afforded standard separation in accordance with Chapters 3, 4, 5, and 6 minima until:

(a) The aircraft lands and the flight is terminated, or

(b) The pilot cancels the flight plan.

(2) Where procedures require application of IFR separation to VFR aircraft practicing instrument approaches, standard separation in accordance with Chapters 3, 4, 5, and 6 shall be provided. Controller responsibility for separation of VFR aircraft begins at the point where the approach clearance becomes effective, or when the aircraft enters TRSA/TCA airspace, whichever comes first. Except for heavy aircraft, 500 feet vertical separation may be applied between VFR aircraft and between a VFR and an IFR aircraft.

4-90a(2) References. — Order 7210.3-833 and 1234

(3) Where separation services are not provided to VFR aircraft practicing instrument approaches, the controller shall;

(a) Instruct the pilot to maintain VFR.

(b) Advise the pilot that separation services are not provided.

(c) Provide traffic information or advise the pilot to contact the appropriate facility.

(4) If an altitude is assigned, including at-or-above/below altitudes, the altitude specified must meet MVA, minimum safe altitude, or minimum IFR altitude criteria.

4-90a(4) Reference. — Altitude Assignments, 7-94.

(5) All VFR aircraft shall be instructed to maintain VFR on initial contact or as soon as possible thereafter.

4-90a(5) Note. — This advisory is intended to remind the pilot that even though ATC is providing IFR-type instructions, the pilot is responsible for compliance with the applicable FARs governing VFR flight.

b. Missed Approaches.

(1) Unless alternate instructions have been issued, IFR aircraft are automatically authorized to execute the missed approach depicted for the instrument approach being flown.

4-90b(1) Reference. — Missed Approach, 4-88.

(2) VFR aircraft are not automatically authorized to execute the missed approach procedure. This authorization must be specifically requested by the pilot and approved by the controller. When a missed approach has been approved, separation shall be provided throughout the missed approach.

4-91 LOW APPROACH AND TOUCH-AND-GO

TERMINAL

Before an aircraft which plans to execute a low approach or touch-and-go begins final descent, issue appropriate departure instructions to be followed upon completion of the approach. Climb-out instructions must include a specific heading and altitude except when the aircraft will maintain VFR and contact the tower.

Phraseology:

AFTER COMPLETING LOW APPROACH/TOUCH-AND-GO:

CLIMB AND MAINTAIN (altitude).

TURN (right or left) HEADING (degrees)/FLY RUNWAY HEADING,

or

MAINTAIN VFR, CONTACT TOWER,

or

(other instructions as appropriate).

4-91 Note. — This may be omitted after the first approach if instructions remain the same.

4-91 Reference. — Overhead Approach, 3-133.

TABLE OF CONTENTS

Page

Chapter 5. RADAR

Section 1. GENERAL

5-1 Presentation and Equipment Performance 5-1
5-2 Alignment Check 5-1
5-3 Radar Use 5-1
5-4 Beacon Range Accuracy 5-1
5-5 ECM/ECCM Activity 5-2
5-6 Service Limitations 5-2
5-7 Electronic Cursor 5-2
5-8 Merging Target Procedures 5-3
5-9 Holding Pattern Surveillance 5-3
5-10 Deviation Advisories 5-3
5-11 Radar Fix Posting 5-3
5-12 Position Reporting 5-34
5-13 Radar Service Termination 5-3
5-14—5-19 Reserved 5-3

Section 2. BEACON SYSTEMS

5-20 Assignment Criteria 5-4
5-21 Discrete Environment 5-4
5-22 Nondiscrete Environment 5-4
5-23 Mixed Environment 5-4
5-24 Radar Beacon Code Changes 5-4
5-25 Function Code Assignments 5-4
5-26 Reverting to Broadband 5-5
5-27 Emergency Code Assignment 5-5
5-28 Radio Failure 5-6
5-29 VFR Code Assignments 5-6
5-30 Beacon Code for Pressure Suit Flights and Flights Above FL 600 5-6
5-31 Air Defense Exercise Beacon Code Assignment 5-6
5-32 Standby or Low Sensitivity Operation 5-7
5-33 Code Monitor 5-7
5-34 Failure to Display Assigned Beacon Code or Inoperative/Malfunctioning Transponder 5-8
5-35 Inoperative or Malfunctioning Interrogator 5-8
5-36 Failed Transponder in Positive Control Area 5-8
5-37 Verification of Automatic Altitude Readout 5-8
5-38 Automatic Altitude Reporting 5-9
5-39 In-Flight Deviations from Transponder/Mode C Requirements Between 12,500 Feet and 18,000 Feet 5-9
5-40 Beacon Termination 5-9
5-41—5-49 Reserved 5-9

Section 3. RADAR IDENTIFICATION

5-50 Application 5-10
5-51 Primary Radar Identification Methods 5-10
5-52 Beacon Identification Methods 5-10
5-53 ARTS/PIDP Identification Methods 5-11
5-54 Questionable Identification 5-11
5-55 Position Information 5-11
5-56 Identification Status 5-11
5-57 Target Markers 5-11
5-58—5-59 Reserved 5-11

Section 4. TRANSFER OF RADAR IDENTIFICATION

5-60 Application 5-12

TABLE OF CONTENTS—Continued

Page
5-61 Terms 5-12
5-62 Methods 5-12
5-63 Traffic 5-12
5-64 Transferring Controller Handoff 5-12
5-65 Receiving Controller Handoff 5-13
5-66 Point Out 5-14
5-67—5-69 Reserved 5-14

Section 5. RADAR SEPARATION

5-70 Application 5-15
5-71 Target Separation 5-15
5-72 Minima 5-15
5-73 Passing or Diverging 5-16
5-74 Additional Separation for Formation Flights 5-16
5-75 Separation From Obstructions 5-16
5-76 Adjacent Airspace 5-17
5-77 Edge of Scope 5-17
5-78 Beacon Target Displacement 5-17
5-79 GPA 102/103 Correction Factor 5-17
5-80—5-89 Reserved 5-17

Section 6. VECTORING

5-90 Application 5-18
5-91 Methods 5-18
5-92—5-99 Reserved 5-19

Section 7. SPEED ADJUSTMENT

5-100 Application 5-20
5-101 Methods 5-20
5-102 Minima 5-21
5-103 Limitations 5-21
5-104 Termination 5-21
5-105—5-109 Reserved 5-21

Section 8. RADAR DEPARTURES

5-110 Procedures 5-22
5-111 Initial Heading 5-22
5-112 Vectors Below Minimum Altitude 5-22
5-113 Successive or Simultaneous Departures 5-22
5-114 Departure and Arrival 5-23
5-115 Departures and Arrivals on Parallel or Nonintersecting Diverging Runways 5-23
5-116—5-119 Reserved 5-24

Section 9. RADAR ARRIVALS

5-120 Vectors to Final Approach Course 5-25
5-121 Final Approach Course Interception 5-25
5-122 Vectors Across Final Approach Course 5-25
5-123 Arrival Instructions 5-25
5-124 Approach Separation Responsibility 5-26
5-125 Parallel ILS Approach 5-27
5-126 Simultaneous ILS Approaches 5-27
5-127—5-129 Reserved 5-28

Section 10. RADAR APPROACHES — *TERMINAL*

5-130 Application 5-29
5-131 Approach Information 5-29
5-132 No-Gyro Approach 5-30

TABLE OF CONTENTS—Continued

Page

5-133 Lost Communications 5-30
5-134 Radar Contact Lost 5-30
5-135 Landing Check 5-30
5-136 Position Information 5-31
5-137 Final Controller Changeover 5-31
5-138 Communications Check 5-31
5-139 Transmission Acknowledgment 5-31
5-140 Wheels Down Check 5-31
5-141 Missed Approach 5-31
5-142 Low Approach and Touch-and-Go 5-31
5-143 Tower Clearance 5-31
5-144 Final Approach Abnormalities 5-32
5-145—5-149 Reserved 5-32

Section 11. SURVEILLANCE APPROACHES — *TERMINAL*

5-150 Altitude Information 5-33
5-151 Visual Reference Report 5-33
5-152 Descent Notification 5-33
5-153 Descent Instructions 5-33
5-154 Final Approach Guidance 5-33
5-155 Approach Guidance Termination 5-34
5-156—5-159 Reserved 5-34

Section 12. PAR APPROACHES — *TERMINAL*

5-160 Glidepath Notification 5-35
5-161 Decision Height (DH) Notification 5-35
5-162 Descent Instruction 5-35
5-163 Glidepath and Course Information 5-35
5-164 Distance from Touchdown 5-35
5-165 Decision Height 5-35
5-166 Position Advisories 5-35
5-167 Communication Transfer 5-35
5-168 Elevation Failure 5-35
5-169 Surveillance Unusable 5-36
5-170—5-179 Reserved 5-36

Section 13. USE OF PAR FOR APPROACH MONITORING — *TERMINAL*

5-180 Monitor on PAR Equipment 5-37
5-181 Monitor Availability 5-37
5-182 Monitor Information 5-37
5-183 Wheels Down Check 5-37
5-184—5-189 Reserved 5-38

Section 14. AUTOMATION — *EN ROUTE*

5-190 Conflict Alert 5-39
5-191 En route Minimum Safe Altitude Warning (E-MSAW) 5-39
5-192 Computer Entry of Assigned Altitude 5-39
5-193 Entry of Reported Altitude 5-39
5-194 Selected Altitude Limits 5-40
5-195 Sector Eligibility 5-40
5-196 Coast Tracks 5-40
5-197 Controller Initiated Coast Tracks 5-40
5-198—5-209 Reserved 5-40

Section 15. AUTOMATED RADAR TERMINAL SYSTEMS (ARTS) — *TERMINAL*

5-210 Application 5-41
5-211 Responsibility 5-41

TABLE OF CONTENTS—Continued

Page

5-212 Functional Use 5-41
5-213 System Requirements 5-41
5-214 Information Displayed 5-41
5-215 Conflict Alert 5-41
5-216 Inhibiting Minimum Safe Altitude Warning (MSAW) 5-41
5-217 Track Suspend Function 5-42
5-218—5-219 Reserved 5-42

Section 16. TPX-42 — *TERMINAL*

5-220 Application 5-43
5-221 Responsibility 5-43
5-222 Functional Use 5-43
5-223 System Requirements 5-43
5-224 Information Displayed 5-43
5-225 Altitude Filters 5-43
5-226 Inhibiting Low Altitude Alert System (LAAS) 5-43

Chapter 5. RADAR

Section 1. GENERAL

5-1 PRESENTATION AND EQUIPMENT PERFORMANCE

Provide radar service only if you are personally satisfied that the radar presentation and equipment performance is adequate for the service being provided.

5-1 Note. — The provision of radar service is not limited to the distance and altitude parameters obtained during the commissioning flight check.

5-2 ALIGNMENT CHECK

TERMINAL

a. Check alignment of the radar video display by assuring that the video map or overlay is properly aligned with a permanent target of known range and azimuth on the radar display. Where possible, check one permanent target per quadrant. This shall be accomplished as soon as possible after assuming responsibility of the control position. Additionally, periodic checks shall be made throughout the watch.

5-2a Reference. — Order 7210.3 — 380, Tolerance for Radar Fix Accuracy.

EN ROUTE

b. When operating in the broadband mode, apply the procedures in a. above.

c. When operating in the narrowband mode (STAGE A), assure the alignment of broadband backup radar according to the procedures in a. above as soon as possible after assuming responsibility of the control position.

5-2c Note. — During Stage A operation, alignment checking is accomplished by the operational program as part of the certification procedures for system startup and then on a real-time basis during operational hours.

5-3 RADAR USE

Use radar information derived from primary and Mode 3/A secondary radar systems.

5-3 Note. — Applicable FAA and military facility management directives outline equipment performance prerequisites, monitoring requirements, deficiency reporting, etc., for using radar. The aviation community is informed via AIM and Advisory Circulars of radar capabilities and constraints on controller services.

5-3 Reference. — Inoperative or Malfunctioning Interrogator, 5-35. Beacon Range Accuracy, 5-4.

a. Display and monitor both primary and secondary radar when available (see 5-3b. and 5-4), except that secondary radar may be used as the sole display source as follows:

(1) In PCA.

5-3a(1) Reference. — Failed Transponder in Positive Control Area, 5-36. FAR 91.97.

(2) Outside PCA, or where mix of PCA/non-PCA exists, only when:

(a) Additional coverage is provided by secondary radar beyond that of the primary radar.

(b) The primary radar is temporarily unusable or out of service. Advise pilots when these conditions exist.

Phraseology:

PRIMARY RADAR OUT OF SERVICE. TRAFFIC ADVISORIES AVAILABLE ON TRANSPONDER AIRCRAFT ONLY.

5-3a(2)(b) Note. — Advisory may be omitted when provided on ATIS and pilot indicates having ATIS information.

(c) *EN ROUTE:* A secondary radar system (e.g., a gap filler) is the only source of radar data for the area of service, and beacon range accuracy is assured as provided in 5-4 when the system is used for separation.

b. *TERMINAL:* Do not use only secondary radar to conduct surveillance (ASR) final approaches unless an emergency exists and the pilot concurs.

5-4 BEACON RANGE ACCURACY

a. Your may use beacon targets for separation purposes if beacon range accuracy is verified by one of the following methods:

5-4a Note 1. — The check for verification of beacon range accuracy accomplished by correlation of beacon and primary radar targets of the same aircraft is not a check of display accuracy. Therefore, it is not necessary that it be done using the same display with which separation is being provided, nor the same targets being separated.

5-4a Note 2. — Narrowband: Beacon range accuracy for automated narrowband display equipment is verified by AF personnel. Consequently, further verification by the controller is unnecessary.

(1) Correlate beacon and primary targets of the same aircraft (not necessarily the one being provided separation) to assure that they coincide.

(2) When beacon and primary targets of the same aircraft do not coincide, correlate them to assure that any beacon displacement agrees with the specified distance and direction for that particular radar system.

(3) Refer to beacon range monitoring equipment where so installed.

b. If beacon range accuracy cannot be verified, you may use beacon targets only for traffic information.

5-5 ECM/ECCM ACTIVITY

a. Refer all ECM/ECCM activity requests to the appropriate center supervisor.

5-5a Reference. — Snow Time, 8-37. 7610.4, Chap. 16, Sec.3, ECM Missions/Exercises.

5-5a Note. — ECM activity can subsequently result in a request to apply ECCM videos to the radar system which may necessitate the decertification of the narrowband search radar. The facility SE should be consulted concerning the effect of ECM/ECCM on the operational use of the radar (narrowband/broadband) prior to approving/disapproving requests to conduct ECM/ECCM activity.

b. When ECM activity interferes with the operational use of radar:

(1) *EN ROUTE:* Request the responsible military unit or aircraft, if initial request was received directly from pilot, to suspend the activity.

(2) *TERMINAL:* Request suspension of the activity through the ARTCC. If immediate cessation of the activity is required, broadcast the request directly to the ECM aircraft on the emergency frequency. Notify the ARTCC of direct broadcast as soon as possible.

c. When previously suspended activity will no longer interfere:

(1) *EN ROUTE:* Inform the NORAD unit or aircraft that it may be resumed.

(2) *TERMINAL:* Inform the ARTCC or aircraft that it may be resumed. Obtain approval from the ARTCC prior to broadcasting a resume clearance directly to the aircraft.

d. In each stop request, include your facility name, type of ECM activity (chaff dispensing — "stream"/"burst" — or electronic jamming — "buzzer"), radar band affected and, when feasible, expected duration of suspension.

Phraseology:

BIG PHOTO (identification, if known) (name) CENTER/TOWER/APPROACH CONTROL,

to stop ECM activity

STOP STREAM/BURST IN AREA (area name) (degree and distance from facility),

or

STOP BUZZER ON (frequency band or channel). To resume ECM activity RESUME STREAM/BURST,

or

RESUME BUZZER ON (frequency band or channel).

5-6 SERVICE LIMITATIONS

a. When radar mapping is not available, limit radar services to:

(1) Separating identified aircraft targets.

(2) Vectoring aircraft to intercept a PAR final approach course.

(3) Providing radar service in areas that ensure no confliction with traffic on airways, other ATC areas of jurisdiction, restricted or prohibited areas, terrain, control zones, etc.

b. *EN ROUTE:* Stage A — When the position symbol associated with the full data block falls more than one history behind the actual aircraft target or there is no target symbol displayed, the Mode C information in the full data block shall not be used for the purpose of determining separation.

c. Report radar malfunctions immediately for corrective action and for dispatch of a Notice to Airmen. Advise adjacent ATC facilities when appropriate.

5-6c Reference. — Responsibility for Reporting Essential Flight Information, 2-9.

5-7 ELECTRONIC CURSOR

TERMINAL

a. An electronic cursor may be used to aid in identifying and vectoring an aircraft and to give finer delineation to a video map. Do not use it as a substitute for a video map or map overlay; e.g., to form intersections, airway boundaries, final approach courses, etc.

b. Fixed electronic cursors may be used to form the final approach course for surveillance approaches conducted by military operated mobile radar facilities.

5-8 MERGING TARGET PROCEDURES

a. Except while they are established in a holding pattern, apply merging target procedures to all radar identified:

(1) Aircraft at 10,000 feet and above.

(2) Turbojet aircraft regardless of altitude.

5-8a(2) Reference. — Glossary (Turbojet Aircraft).

(3) Presidential aircraft regardless of altitude.

b. Issue traffic information to those aircraft listed in a. whose targets appear likely to merge unless the aircraft are separated by more than the appropriate vertical separation minima.

c. If the pilot requests, vector his aircraft to avoid merging with the target of previously issued traffic.

5-8c Note. — Aircraft closure rates are so rapid that when applying merging target procedures, controller issuance of traffic must be commenced in ample time for the pilot to decide if a vector is necessary.

d. If unable to provide vector service, inform the pilot.

5-9 HOLDING PATTERN SURVEILLANCE

Provide radar surveillance of outer fix holding pattern airspace areas, or any portions thereof, shown on your radar scope (displayed on the video map or scribed on the map overlay) whenever aircraft are holding there. Attempt to detect any that stray outside the area. If you detect an aircraft straying outside the area, assist it to return to the assigned airspace.

5-10 DEVIATION ADVISORIES

Inform an aircraft when it is observed in a position and on a track which will obviously cause the aircraft to deviate from its protected airspace area. If necessary, assist the aircraft to return to the assigned protected airspace.

5-11 RADAR FIX POSTING

EN ROUTE

Except during full NAS Stage A operations: at lease once in each sector, record on the flight progress strip the time of observed position of each aircraft in "radar contact" with respect to a fix shown on the radar display.

5-12 POSITION REPORTING

a. If necessary, you may request an aircraft to provide an estimate or report over a specific fix.

5-12a Note. — After an aircraft receives the statement "radar contact" from ATC, it discontinues reporting over compulsory reporting points. It resumes normal position reporting when ATC informs it "radar contact lost" or "radar service terminated."

5-12a Reference. — Glossary (Radar Contact).

b. When required, inform an aircraft of its position with respect to a fix or airway.

Phraseology:

OVER/PASSING (fix)

(Number of miles) MILES FROM (fix).

(Number of miles) MILES (direction) OF (fix, airway, or location).

CROSSING/JOINING/DEPARTING (airway or route).

INTERCEPTING/CROSSING (name of NAVAID) (specified) RADIAL.

5-13 RADAR SERVICE TERMINATION

a. Inform aircraft when radar service is terminated.

Phraseology:

RADAR SERVICE TERMINATED (nonradar routing, if required).

b. Radar service is automatically terminated and the aircraft need not be advised of termination in the following cases:

5-13b Note. — Termination of radar monitoring when conducting simultaneous ILS approaches is prescribed in 5-126h(3). Termination of radar monitoring where PAR equipment is used to monitor approaches is prescribed in 5-182e.

(1) An aircraft cancels its IFR flight plan, except within a TCA, ARSA, TRSA, or where Stage II service is provided.

(2) An aircraft making an instrument approach has landed or the tower sights the aircraft whichever occurs first.

(3) An aircraft conducts a visual approach or contact approach and is advised to contact the tower.

(4) *TERMINAL:* An arriving VFR aircraft, receiving radar services, is advised to contact the tower.

(5) *TERMINAL:* At the completion of a radar approach.

5-14 thru 5-19 RESERVED

Section 2. BEACON SYSTEMS

5-20 ASSIGNMENT CRITERIA

a. General

(1) Mode 3/A is designated as the common military/civil mode for air traffic control use.

(2) Make radar beacon code assignments to only Mode 3/A transponder equipped aircraft.

b. Unless otherwise specified in a directive or a letter of agreement, make code assignments to departing, en route, and arrival aircraft in accordance with the procedures specified in this section for the radar beacon code environment in which you are providing ATC service. Give first preference to the use of discrete beacon codes.

Phraseology:

SQUAWK THREE/ALFA (code).

or

SQUAWK (code).

5-20b Note. — A code environment is determined by an operating position's/sector's equipment capability to decode radar beacon targets using either the first and second or all four digits of a beacon code.

5-21 DISCRETE ENVIRONMENT

a. Issue discrete beacon codes assigned by the computer. Computer assigned codes may be modified as required.

(1) *TERMINAL:* Aircraft that will remain within the terminal facility's delegated airspace shall be assigned a code from the code subset allocated to the terminal facility.

(2) *TERMINAL:* Aircraft that will enter an adjacent ARTS facility's delegated airspace shall be assigned a beacon code assigned by the ARTCC computer.

5-21a(2) Note. — This will provide the adjacent facility advance information on the aircraft and will cause auto-acquisition of the aircraft prior to handoff.

b. Make handoffs to other positions/sectors on the computer assigned code.

c. Coastal facilities accepting "over" traffic that will subsequently be handed-off to an oceanic ARTCC shall reassign a new discrete beacon code to an aircraft when it first enters the receiving facility's airspace. The code reassignment shall be accomplished by inputting an appropriate message into the computer and issued to the pilot while operating in the first sector/position in the receiving facility's airspace.

5-21c Note. — Per an agreement between the FAA and the Department of Defense, 18 code subsets in the NBCAP have been reserved for exclusive military use in oceanic airspace. To maximize the use of these code subsets, they have also been allocated to ARTCCs underlying NBCAP airspace that do not abut an oceanic ARTCC's area. In order to preclude a potential situation where two aircraft might be in the same airspace at the same time on the same discrete code, it is necessary to reassign an aircraft another code as specified in 5-21c.

5-22 NONDISCRETE ENVIRONMENT

a. Assign appropriate nondiscrete beacon codes from the function codes specified in 5-25.

b. Unless otherwise coordinated at the time of handoff, make handoffs to other positions/sectors on an appropriate nondiscrete function code.

5-23 MIXED ENVIRONMENT

a. When discrete beacon code capability does not exist in your area of responsibility, comply with the procedures specified in 5-22.

5-23 Note. — In a mixed code environment a situation may exist where a discrete equipped position/sector exchanges control of aircraft with nondiscrete equipped facilities or vice versa.

b. When discrete beacon code capability exists in your area of responsibility:

(1) Comply with the procedures specified in 5-21, and

(2) Unless otherwise coordinated at the time of handoff, assign aircraft that will enter the area of responsibility of a nondiscrete equipped position/sector an appropriate nondiscrete function code from the codes specified in 5-25 prior to initiating a handoff.

5-24 RADAR BEACON CODE CHANGES

Unless otherwise specified in a directive or a letter of agreement or coordinated at the time of handoff, do not request an aircraft to change from the code it was squawking in the transferring facility's area until the aircraft is within your area of responsibility.

5-25. FUNCTION CODE ASSIGNMENTS

Unless otherwise specified by a Directive or a letter of agreement, make nondiscrete code assignments from the following categories:

a. Assign codes to departing IFR aircraft as follows:

(1) Code 2000 to an aircraft which will climb to FL 240 or above, or to an aircraft which will climb to FL 180 or above where the base of PCA and the base of the operating sector are at FL 180, and for inter-facility handoff, the receiving sector is also stratified at FL 180. The en route code shall not be

assigned until the aircraft is established in the high altitude sector.

(2) Code 1100 to an aircraft which will remain below FL 240 or below FL 180 as in (1) above.

(3) For handoffs from terminal facilities when so specified in a Letter of Agreement as follows:

(a) Within NBCAP airspace — Code 0100 to code 0400 inclusive, or any other code authorized by the Regional Air Traffic Division.

(b) Outside NBCAP airspace — Code 1000 or one of the codes from 0100 to 0700 inclusive, or any other code authorized by the Regional Air Traffic Division.

b. Assign codes to en route IFR aircraft as follows:

5-25b Note. — FL 180 may be used in lieu of FL 240 where the base of PCA and the base of the operating sector are at FL 180 and for inter-facility handoff, the receiving sector is also stratified at FL 180. The provisions of (2)(b) and (2)(c) may be modified by facility directive or letter of agreement when operational complexities or simplified sectorization indicate. Letters of Agreement are mandatory when the operating sectors of two facilities are not stratified at identical levels. The general concept of utilizing codes 2100 through 2500 within PCA should be adhered to.

(1) Aircraft operating below FL 240, or when control is transferred to a controller whose area includes the stratum involved.

(a) Code 1000 may be assigned to aircraft changing altitudes.

(b) Code 1100 to an aircraft operating at an assigned altitude below FL 240. Should an additional code be operationally desirable, code 1300 shall be assigned.

(2) Aircraft operating at or above FL 240, or when control is transferred to a controller whose area includes the stratum involved.

(a) Code 2300 may be assigned to Aircraft changing altitudes.

(b) Code 2100 to an aircraft operating at an assigned altitude from FL 240 to FL 330 inclusive. Should an additional code be operationally desirable, code 2200 shall be assigned.

(c) Code 2400 to an aircraft operating at an assigned altitude from FL 350 to FL 600 inclusive. Should an additional code be operationally desirable, code 2500 shall be assigned.

(3) Code 4000 — When aircraft are operating on a flight plan specifying frequent or rapid changes in assigned altitude in more than one stratum, or other conditions of flight not compatible with a stratified code assignment.

5-25b(3) Note 1. — Categories of flight that can be assigned code 4000 include certain flight test aircraft, MTR missions, aerial refueling operation requiring descent involving more than one stratum, ALTRVs where continuous monitoring of ATC communications facilities is not required and frequent altitude changes are approved, and other aircraft operating on flight plans requiring special handling by ATC.

5-25b(3) Note 2. — Military aircraft operating VFR or IFR in restricted/warning areas or VFR on VR routes will adjust their transponders to reply on code 4000 unless another code has been assigned by ATC or coordinated, if possible, with ATC.

c. Assign the following codes to arriving IFR aircraft, except military turbojet aircraft as specified in 4-63:

5-25c Note. — FL 180 may be used in lieu of FL 240 where the base of PCA and the base of the operating sector are at FL 180 and for inter-facility handoff, the receiving sector is also stratified at FL 180.

(1) Code 2300 may be assigned for descents while above FL 240.

(2) Code 1500 may be assigned for descents into and while within the strata below FL 240, or with prior coordination, the specific code utilized by the destination controller or the code currently assigned when descent clearance is issued.

(3) The applicable en route code for the holding altitude if holding is necessary before entering the terminal area and the appropriate code in (1) or (2).

5-26 REVERTING TO BROADBAND

When the narrowband system is no longer available/usable for ATC purposes, aircraft operating on computer assigned codes shall be instructed to squawk the Function Code appropriate for your area of responsibility.

5-26 Note. — During the transition to the broadband mode, targets can be maintained by selecting on the broadband decoder equipment the codes in use by aircraft in your area or activating the "all" beacon feature.

Phraseology:

ALL AIRCRAFT ON THIS FREQUENCY SQUAWK (appropriate code).

5-27 EMERGENCY CODE ASSIGNMENT

Assign codes to emergency aircraft as follows:

a. Code 7700 when the pilot declares an emergency and the aircraft is not radar identified.

Phraseology:

SQUAWK MAYDAY ON 7700.

b. After radio and radar contact have been established, you may request other than single-piloted helicopters and single-piloted turbojet aircraft to change from code 7700 to another code appropriate for your radar beacon code environment.

5-27b Note 1. — The code change, based on pilot concurrence, the nature of the emergency, and current flight conditions will signify to other radar facilities that the aircraft in distress is identified and under ATC control.

5-27b Note 2. — Pilots of single-piloted helicopters and single-piloted turbojet aircraft may be unable to reposition transponder controls during the emergency.

Phraseology:

RADAR CONTACT (position). IF FEASIBLE, SQUAWK (code).

5-28 RADIO FAILURE

When you observe a code 7600 display, apply the procedures in 9-43, Communications Failure.

5-28 Note. — Should a transponder equipped aircraft experience a loss of two-way radio communications capability, the pilot can be expected to adjust his transponder to code 7600.

5-29 VFR CODE ASSIGNMENTS

a. Provided the aircraft is within your area of responsibility or prior coordination has been affected with the facility/sector in whose area an aircraft is operating and an operational benefit will be gained, assign aircraft operating with a clearance specifying "VFR-on-top," "VFR conditions," or VFR aircraft receiving radar advisories an appropriate Function Code or computer-assigned code for the code environment in which you are providing service.

5-29a Note 1. — Paragraphs 5-21, 5-22, and 5-23 specify code assignments procedures to follow for the three code environments.

5-29a Note 2. — Paragraphs 5-25,a, b, and c, specify Function Code allocation from which an appropriate code for the aircraft indicated in 5-29a should be selected. In the terminal environment, additional Function Codes may be authorized by the regional Air Traffic Division.

b. Instruct IFR aircraft which cancel an IFR flight plan and are not requesting radar advisory service and VFR aircraft for which radar advisory service is being terminated to squawk the VFR code.

Phraseology:

SQUAWK 1200.

5-29b Note. — VFR aircraft which fly authorized SAR missions for the USAF or USCG may be advised to squawk 1277 in lieu of 1200 while en route to/from or within the designated search area.

5-29b Reference. — FAA Order 7110.66A, National Beacon Code Allocation Plan.

5-30 BEACON CODE FOR PRESSURE SUIT FLIGHTS AND FLIGHTS ABOVE FL 600

a. Mode 3/A, code 4400, and discrete codes 4401 through 4477 are reserved for use by R-71, F-12, U-2, B-57, pressure suit flights, and aircraft operations above FL 600.

5-30a Note. — The specific allocation of reserved codes in code subset 4400 may be found in NBCAP, Order 7110.66A.

b. Ensure aircraft remain on code 4400 or one of the reserved discrete codes if filed as part of the flight plan. Except when unforeseen events such as weather deviations, equipment failure, etc., cause more than one aircraft with same Mode 3/A discrete beacon codes to be in the same or adjacent ARTCC's airspace at the same time, a controller may request the pilot to make a code change, squawk standby, or to stop squawk as appropriate.

5-30b Note. — Due to the inaccessibility of certain equipment to the flight crews, code 4400 or a discrete code from the 4400 code subset is preset on he ground and will be used throughout the flight profile including operations below FL 600. Controllers should be cognizant that not all aircraft may be able to accept the transponder changes identified in the Exception. Emergency code 7700, however, can be activated.

5-31 AIR DEFENSE EXERCISE BEACON CODE ASSIGNMENT

EN ROUTE

Ensure exercise target aircraft remain on the exercise flight plan filed discrete beacon code except:

5-31 Note 1. — The Federal Aviation Administration and the North American Aerospace Defense Command (NORAD) have consummated a Memorandum of Understanding specifying procedures and beacon code allocation for handling target aircraft participating in Air Defense Exercises. NORAD will ensure exercise target aircraft flight plans are filed containing four digit discrete beacon code based on the altitude stratum filed in the exercise flight plan. Target aircraft flight planning for the high altitude stratum will be filed with beacon codes from the 6400 and 7100 subsets. Target aircraft flight planning for the low altitude stratum will be filed with beacon codes from 5400 and 6100 subsets.

5-31 Note 2. — Code 50(dd) will be used to indicate a target aircraft is unavailable or no longer safe for intercept. The third and fourth digits will be the same as those filed in the flight plan.

5-31 Note 3. — NORAD will ensure that those target aircraft assigned the same discrete beacon code are not flight planned in the same or any adjacent ARTCC's airspace at the same time. (Simultaneous assignment of codes will only occur when operational requirements necessitate.)

a. During periods of broadband operations, the first digit of the exercise flight plan filed discrete beacon code shall be changed by one digit to accommodate stratum changes as follows:

(1) Departing exercise target aircraft that flight planned in the high altitude stratum with a filed discrete beacon code from one of the high al-

SQUAWK ALTITUDE is included to provide applicable phraseology.

5-53 ARTS/PIDP IDENTIFICATION METHODS

TERMINAL

a. Consider an auto-acquired aircraft as identified when its data block is displayed and is visible to you, not in coast, and one of the following conditions exist:

(1) Radar or beacon identification procedures have been used to confirm the identity of the tagged target.

(2) The aircraft is being handed off through use of NAS Stage A/ARTS, NAS Stage A/PIDP, or ARTS/ARTS automated handoff and "AM," "AMB," "TU," "NAT," "NB," or "CST" does not appear in the data block.

b. Use the ARTS/PIDP data block to maintain target identity unless it is in a coast status or displaced from the appropriate target.

c. Displaced data block shall be updated at all times.

5-54 QUESTIONABLE IDENTIFICATION

a. Use more than one method of identification when proximity of targets, duplication of observed action, or any other circumstances cause doubt as to target identification.

b. If identification is questionable for any reason, take immediate action to reidentify the aircraft or terminate radar service.

5-55 POSITION INFORMATION

Inform an aircraft of its position whenever radar identification is established by means of identifying turns or by any of the beacon identification methods outlined in 5-52. Position information need not be given when identification is established by position correlation or when a departing aircraft is identified within 1 mile of the take-off runway end.

5-56 IDENTIFICATION STATUS

a. Inform an aircraft of radar contact when:

(1) Initial radar identification in the ATC system is established.

(2) Subsequent to loss of radar contact or terminating radar service, radar identification is reestablished.

Phraseology:

RADAR CONTACT (position, if required).

b. Inform an aircraft when radar contact is lost.

Phraseology:

RADAR CONTACT LOST (alternative instructions, when required).

5-57 TARGET MARKERS

EN ROUTE

a. Use radar target markers (shrimp boats/data blocks) on horizontal scopes to provide continuous target identity. Post flight identification and altitude, when constant, on markers. Post miscellaneous items (abbreviated route, vector headings, arrows to indicate climb or descent, etc.) at your discretion. To prevent misinterpretation, use standard hand printed characters.

b. Automated Systems — Use data blocks that are associated with the appropriate target symbol to provide continuous identity. Display flight identification, interim altitude or assigned altitude if interim altitude is not being used, and reported altitude as minimum display. Interim/assigned altitude, reported altitude, or flight identification, or all may be temporarily inhibited in NAS En route Stage A to eliminate an existing data block overlap condition.

5-58 thru 5-59 RESERVED

Section 4. TRANSFER OF RADAR IDENTIFICATION

5-60 APPLICATION

To provide continuous radar service to an aircraft and facilitate a safe, orderly, expeditious flow of traffic, it is often necessary to transfer radar identification of an aircraft from one controller to another. This section describes the terms, methods, and responsibilities associated with this task. Inter- and intrafacility transfers of radar identification shall be accomplished in all areas of radar surveillance except where it is not operationally feasible. Where such constraints exist, they shall be:

a. Covered in letters of agreement which clearly state that control will not be based upon a radar handoff, or

b. Coordinated by the transferring and receiving controllers for a specified period of time.

5-61 TERMS

a. *Handoff* — An action taken to transfer the radar identification of an aircraft from one controller to another controller if the aircraft will enter the receiving controller's airspace and radio communications with the aircraft will be transferred.

b. *Radar Contact* — The term used to inform the controller initiating a handoff that the aircraft is identified and approval is granted for the aircraft to enter the receiving controller's airspace.

c. *Point Out* — An action taken by a controller to transfer the radar identification of an aircraft to another controller if the aircraft will or may enter the airspace or protected airspace of another controller and radio communications will not be transferred.

d. *Point Out Approved* — The term used to inform the controller initiating a point out that the aircraft is identified and that approval is granted for the aircraft to enter the receiving controller's airspace, as coordinated, without a communications transfer.

e. *Traffic* — A term used to transfer radar identification of an aircraft to another controller for the purpose of coordinating separation action. Traffic is normally issued (a) in response to a handoff or point out, (b) in anticipation of a handoff or point out, or (c) in conjunction with a request for control of an aircraft.

f. *Traffic Observed* — The term used to inform the controller issuing the traffic restrictions that the traffic is identified and that the restrictions issued are understood and will be complied with.

5-62 METHODS

a. Transfer the radar identification of an aircraft by at least one of the following methods:

(1) Physically point to the target on the receiving controller's display.

(2) Use landline voice communications.

(3) Use automation capabilities.

(4) *TERMINAL:* Use the "Modify" or "Quick Look" functions for data transfer between the TRACON and tower cab only if specific procedures are established in a facility directive. The local controller has the responsibility to determine whether or not conditions are adequate for the use of ARTS data on the BRITE.

5-62a(4) Reference. — Order 7210.3 — 1323, Use of ARTS Modify and Quick Look Functions

b. When using the above methods, comply with the Standard Operating Practice contained in Appendix 5.

c. When making a handoff, point out, or issuing traffic restrictions, relay information to the receiving controller in the following order:

(1) The position of the target relative to a fix, map symbol, or radar target known and displayed by both the receiving and transferring controller.

(2) The aircraft identification.

(3) The assigned altitude, appropriate restrictions, and information that the aircraft is climbing or descending, if applicable, except when inter/intrafacility directives ensure that the altitude information will be known by the receiving controller.

d. If any doubt as to target identification exists after attempting confirmation in accordance with this section, apply the provisions of paragraph 5-54, Questionable Identification.

5-63 TRAFFIC

a. When using the term "traffic" for coordinating separation, the controller issuing traffic shall issue appropriate restrictions.

b. The controller accepting the restrictions shall be responsible to ensure that approved separation is maintained between the involved aircraft.

5-64 TRANSFERRING CONTROLLER HANDOFF

The transferring controller shall:

a. Complete a radar handoff prior to an aircraft entering the airspace delegated to the receiving controller.

b. Verbally obtain the receiving controller's approval prior to making any changes to an aircraft's flight path, altitude, or data block information while the handoff is being initiated or after acceptance.

c. Ensure that potential conflicts are resolved prior to transferring communications and that restrictions issued to the aircraft to ensure separation are passed to the receiving controller.

d. Comply with restrictions issued by the receiving controller unless otherwise coordinated.

e. Transfer communications before an aircraft enters the receiving controller's area unless otherwise coordinated. To the extent possible, transfer communications when the handoff has been accepted.

5-64e Note. — Before ARTS Modify/Quick Look function is used to transfer radar identification, a facility directive which specifies communication transfer points is required.

f. Advise the receiving controller of pertinent information not contained in the data block of flight progress strip unless covered in a letter of agreement or facility directive. Pertinent information includes:

(1) Assigned heading.

(2) Air speed restrictions.

(3) Altitude information issued.

(4) Observed track or deviation from the last route clearance.

(5) The beacon code if different from that normally used or previously coordinated.

(6) Any other pertinent information.

g. Ensure that the data block is associated with the appropriate target.

h. Initiate verbal coordination to verify the position of primary or nondiscrete targets when using the automated handoff functions except for intrafacility handoffs using single-sensor systems or multisensor systems operating in a mosaic RDP mode.

i. Initiate verbal coordination before transferring control of a track when "CST," "FAIL," "NONE," "NB," or "IF" is displayed in the data block.

j. Advise the receiving controller that radar monitoring is required when the aircraft is on a direct route initiated by ATC that exceeds usable navaid distances.

k. Issue restrictions to the receiving controller which are necessary to maintain separation from other aircraft within your area of jurisdiction before releasing control of the aircraft.

l. Consider the target being transferred as identified on the receiving controller's display when the receiving controller acknowledges receipt verbally or has accepted an automated handoff.

5-65 RECEIVING CONTROLLER HANDOFF

The receiving controller shall:

a. Ensure that the target position corresponds with the position given by the transferring controller or that there is an appropriate association between an automated data block and the target being transferred before accepting an handoff.

b. Issue restrictions that are needed for the aircraft to enter your sector safely before accepting the handoff.

c. Comply with restrictions issued by the initiating controller unless otherwise coordinated.

d. If you need to change an aircraft's heading, speed, altitude, or beacon code within another controller's area of jurisdiction, coordinate such changes with that controller and, as required, any intervening controller through whose area the aircraft will pass, prior to making the change, unless such changes are covered by a letter of agreement or facility directive.

e. After accepting a handoff from another controller, confirm the identity of primary target by advising the aircraft of its position, and of a beacon target by observing a code change, an "Ident" reply, or a "standby" squawk unless one of these was used during handoff. These provisions do not apply at those towers and GCAs which have been delegated the responsibility for providing radar separation within designated areas by the parent approach control facility and the aircraft identification is assured by sequencing or positioning prior to the handoff.

5-65e Reference. — Approach Separation Responsibility, 5-124.

f. When using appropriate equipment, consider a discrete beacon target's identity to be confirmed when:

(1) The data block associated with the target being handed off indicates the computer assigned discrete beacon code is being received, or

(2) You observe the deletion of a discrete code that was displayed in the data block, or

5-65f(2) Note. — When the aircraft generated discrete beacon code does not match the computer assigned beacon code, the code generated will be displayed in the data block. When the aircraft changes to the assigned discrete code, the code disappears from the data block. In this instance, the observance of code removal from the data block satisfies confirmation requirements.

(3) You observe the numeric display of a discrete code that an aircraft has been instructed to squawk or reports squawking.

g. Initiate verbal coordination prior to accepting control of a track when "CST," "NAT," "AMB," "NONE," "OLD," "NB," "TU," "AM," or "OL" is displayed in the data block.

(1) When an automated interfacility handoff action is initiated and "AMB" or "AM" is displayed in the full data block, advise the other facility that a disparity exists between the position declared by their computer and that declared by your ARTS/PIDP.

(2) When an automated interfacility handoff action is initiated and "NAT" or "TU" is displayed in the full data block, advise the other facility if a disparity exists between the position declared by their computer and the actual target position.

5-66 POINT OUT

a. The transferring controller shall:

(1) Obtain verbal approval before permitting an aircraft to enter the receiving controller's delegated airspace.

(2) Obtain the receiving controller's approval before making any changes to an aircraft's flight path, altitude, or data block information after the point out has been approved.

(3) Comply with restrictions issued by the receiving controller unless otherwise coordinated.

(4) Be responsible for subsequent radar handoffs and communications transfer, including flight data revisions and coordination, unless otherwise agreed to by the receiving controller or as specified in a letter of agreement.

b. The receiving controller shall:

(1) Ensure that the target position corresponds with the position given by the transferring controller or that there is an association between a computer data block and the target being transferred prior to approving a point out.

(2) Be responsible for separation between point out aircraft and other aircraft for which he/she has separation responsibility.

(3) Issue restrictions necessary to provide separation from other aircraft within his/her area of jurisdiction.

5-67 thru 5-69 RESERVED

5-76 ADJACENT AIRSPACE

a. If coordination between the controllers concerned has not been effected, separate radar-controlled aircraft from the boundary of adjacent airspace in which radar separation is also being used by the following minima:

5-76a Reference. — Coordinate Use of Airspace, 2-14.

(1) When less than 40 miles from the antenna — *1 ½ miles.*

(2) When 40 miles or more from the antenna — *2 ½ miles.*

(3) En Route Stage A/DARC:

(a) Below Flight Level 600 — *2 ½ miles.*

(b) Flight Level 600 and above — *5 miles.*

b. Separate radar-controlled aircraft from the boundary of airspace in which nonradar separation is being used by the following minima:

(1) When less than 40 miles from the antenna — *3 miles.*

(2) When 40 miles or more from the antenna — *5 miles.*

(3) En Route Stage A/DARC:

(a) Below Flight Level 600 — *5 miles.*

(b) Flight Level 600 and above — *10 miles.*

5-77 EDGE OF SCOPE

Separate a radar-controlled aircraft climbing or descending through the altitude of an aircraft that has been tracked to the edge of the scope/display by the following minima until nonradar separation has been established:

a. When less than 40 miles from the antenna — *3 miles* from edge of scope.

b. When 40 miles or more from the antenna — *5 miles* from edge of scope.

c. En Route Stage A/DARC:

(1) Below Flight Level 600 — *5 miles.*

(2) Flight Level 600 and above — *10 miles.*

5-78 BEACON TARGET DISPLACEMENT

When using a radar target display with a previously specified beacon target displacement to separate a beacon target from a primary target, adjacent airspace, obstructions, or terrain, add a 1-mile correction factor to the applicable minima.

5-78 Note. — The maximum allowable beacon target displacement which may be specified by the facility air traffic manager is 1/2 mile.

5-78 Reference. — Order 7210.3 — 373, Monitoring of Mode 3/A Radar Beacon Codes.

5-79 GPA 102/103 CORRECTION FACTOR

When using a radar display whose primary radar video is processed by the GPA 102/103 modification to a joint-use radar system, apply the following correction factors to the applicable minima:

a. If less than 40 miles from the antenna — add *1 mile.*

b. If 40 miles or more, but not over 200 miles, from the antenna — add *3 miles.*

5-80 thru 5-89 RESERVED

Section 6. VECTORING

5-90 APPLICATION

Vector aircraft:

a. In controlled airspace for separation, safety, noise abatement, operational advantage, or when a pilot requests. Allow aircraft operating on an RNAV route to remain on their own navigation to the extent possible.

b. In uncontrolled airspace only upon pilot request and as an additional service.

c. At or above MVA or the minimum IFR altitude except as authorized for missed approaches, radar approaches, departures, Special VFR and VFR operations.

5-90c Note. — VFR aircraft not at an altitude assigned by ATC may be vectored at any altitude. It is the responsibility of the pilot to comply with the applicable FARs.

5-90c References. — Minimum En route Altitudes, 4-44; Priority, 7-41; Altitude Assignment, 7-43, 7-94. FAR 91.79, Minimum Safe Altitudes.

d. In airspace for which you have control jurisdiction, unless otherwise coordinated.

e. So as to permit it to resume its own navigation within radar coverage.

f. Operating Special VFR only within control zones.

g. Operating VFR at those locations where a special program is established, or when a pilot requests, or you suggest and the pilot concurs.

5-90g Reference. — Order 7210.3, Chapter 13, Section 1, National Terminal Radar Program.

5-91 METHODS

a. Vector aircraft by specifying:

(1) Direction of turn, if appropriate, and magnetic heading to be flown, or

Phraseology:

TURN LEFT/RIGHT HEADING (degrees).

FLY HEADING (degrees).

FLY PRESENT HEADING.

DEPART (fix) HEADING (degrees).

(2) The number of degrees, in group form, to turn and the direction of turn, or

Phraseology:

TURN (number of degrees) DEGREES LEFT/RIGHT.

(3) For NO-GYRO procedures, the type of vector, direction of turn, and when to stop turn.

Phraseology:

THIS WILL BE A NO-GYRO VECTOR,
TURN LEFT/RIGHT.
STOP TURN.

b. When initiating a vector, advise the pilot of the purpose.

Phraseology:

FOR VECTOR TO (fix or airway).

FOR VECTOR TO INTERCEPT (name of NAVAID) (specified) RADIAL.

VECTOR FOR SPACING.

FOR VECTOR TO FINAL APPROACH COURSE,

or if the pilot does not have knowledge of the type of approach,

FOR VECTOR TO (approach name) FINAL APPROACH COURSE.

c. Issue with the vector an altitude to maintain and all appropriate altitude restrictions when:

(1) The vector will take the aircraft off an assigned procedure which contains altitude instructions, i.e., instrument approach, non-radar SID, etc.

(2) The previously issued clearance included crossing restrictions.

5-91c Reference. — Route or Altitude Amendments, 4-14.

d. If appropriate, advise the pilot what to expect when the vector is completed.

Phraseology:

EXPECT TO RESUME (route, SID, STAR, etc.).

5-91d Note. — You must ensure that the pilot is made aware if he is expected to resume a previously issued route/procedure.

e. Provide radar navigational guidance until the aircraft is:

(1) Established within the airspace to be protected for the nonradar route to be flown, or

(2) On a heading that will, within a reasonable distance, intercept the nonradar route to be flown, and

(3) Informed of its position unless the aircraft is RNAV or DME equipped and being vectored toward a VORTAC/TACAN or Waypoint and within the service volume of the NAVAID.

Phraseology:

(Position with respect to course/fix along route), RESUME OWN NAVIGATION,

or

FLY HEADING (degrees) UNTIL RECEIVING (name) NAVAID/WAYPOINT, THEN PROCEED DIRECT,

or

bojet aircraft. Specifying which action is to be accomplished first removes any doubt the pilot may have as to controller intent or priority.

5-101b Note 2. — When specifying descent prior to speed reduction, consider the maximum speed requirements specified in FAR 91.70. It may be necessary for the pilot to level off temporarily and reduce speed prior to descending below 10,000 feet MSL.

c. Specify combined speed/altitude fix crossing restrictions.

Phraseology:

CROSS (fix) AT AND MAINTAIN (altitude) AT (specified speed) KNOTS.

5-101c Example. —

"Cross Robinsville at and maintain six thousand at two three zero knots."

5-102 MINIMA

Unless a pilot concurs in the use of a lower speed, use the following minima:

a. To aircraft operating between FL 280 and 10,000 feet, a speed not less than 250 knots or the equivalent mach number.

5-102a Note. — On a standard day the mach numbers equivalent to 250 knots CAS (subject to minor variations) are: FL 240 — 0.6; FL 250 — 0.61; FL 260 — 0.62; FL 270 — 0.64; FL 280 — 0.65; FL 290 — 0.66.

b. To arrival aircraft operating below 10,000 feet:

(1) Turbojet aircraft — A speed not less than 210 knots; except when the aircraft is within 20 flying miles of the runway threshold of the airport of intended landing, a speed not less than 170 knots.

(2) Reciprocating engine and turboprop aircraft — A speed not less than 150 knots when the aircraft is within 20 flying miles of the runway threshold of the airport of intended landing.

c. Departures:

(1) Turbojet aircraft — A speed not less than 230 knots.

(2) Reciprocating engine and turboprop aircraft — A speed not less than 150 knots.

d. Helicopters — A speed not less than 60 knots.

5-103 LIMITATIONS

Accomplish speed adjustment to aircraft which cannot attain the minimum speeds set forth in 5-102 by requesting such flights to, if practical:

a. Maintain a specified speed equivalent to that of the preceding or succeeding aircraft, or

b. Increase or decrease speed utilizing increments of 10 knots or multiples thereof.

Phraseology:

IF PRACTICAL, MAINTAIN (specific speed) KNOTS,

or

IF PRACTICAL, INCREASE/REDUCE SPEED (specified knots) KNOTS.

5-104 TERMINATION

Advise aircraft when speed adjustment is not longer needed.

Phraseology:

RESUME NORMAL SPEED.

5-105 thru 5-109 RESERVED

Section 8. RADAR DEPARTURES

5-110 PROCEDURES

Use standard departure routes and channelized altitudes whenever practical to reduce coordination. Do not, however, assign these routes solely to provide for possible radar or communication failure.

5-111 INITIAL HEADING

Before departure, assign the initial heading to be flown if a departing aircraft is to be vectored immediately after takeoff.

Phraseology:

FLY RUNWAY HEADING.

TURN LEFT/RIGHT, HEADING (degrees).

5-111 Note. — *TERMINAL:* A purpose for the heading is not necessary, since pilots operating in a radar environment associate assigned headings with vectors to their planned route of flight.

5-111 Reference. — Clearances, 4-21.

5-112 VECTORS BELOW MINIMUM ALTITUDE

Except in en route automated environments in areas where more than 3 miles separation minima is required, you may vector a departing IFR aircraft, or one executing a missed approach, within 40 miles of the antenna and before it reaches the minimum altitude for IFR operations if separation from prominent obstructions shown on the radar scope is applied in accordance with the following:

a. If the flight path is 3 miles or more from the obstruction and the aircraft is climbing to an altitude at least 1,000 feet above the obstruction, vector the aircraft to maintain at least 3 miles separation from the obstruction until the aircraft reports leaving an altitude above the obstruction.

b. If the flight path is less than 3 miles from the obstruction, and the aircraft is climbing to an altitude at least 1,000 feet above the obstruction, vector the aircraft to increase lateral separation from the obstruction until the 3-mile minimum is achieved or until the aircraft reports leaving an altitude above the obstruction.

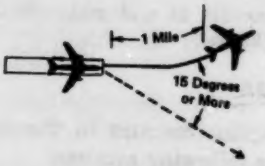
5-113 SUCCESSIVE OR SIMULTANEOUS DEPARTURES

TERMINAL

Separate aircraft departing from the same airport or adjacent airports in accordance with the following minima provided radar identification with the aircraft will be established within 1 mile of the takeoff runway end and courses will diverge by 15 degrees or more.

5-113 Note. — Order 8260.19, Flight Procedures and Airspace, establishes guidelines for IFR departure turning procedures which assumes a climb to 400 feet before a turn is commenced. Order 8290.3, TERPS, the ILS missed approach criteria require a straight climb of 400 feet be specified where turns greater than 15 degrees are required.

a. Between aircraft departing the same runway, or parallel runways separated by less than 2,500 feet — 1 mile if courses diverge immediately after departure.



5-113a Illustration 1

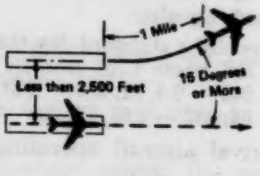


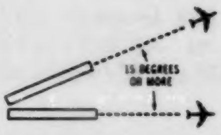
Illustration 2

5-113a Note. — This procedure does not apply when Category I or II aircraft are taking off from an intersection on the same runway behind a preceding departing Category III aircraft or when aircraft are departing behind a heavy jet.

5-113a Reference. — Intersecting Runway Separation, 3-108; Intersection Takeoff, 3-107; Minima, 5-72.

b. Between aircraft departing from diverging runways:

(1) Nonintersecting runways — Authorize simultaneous takeoffs if runways diverge by 15 degrees or more.



5-113b(1) Illustration

(2) Intersecting runways which diverge by 15 degrees or more — Authorize takeoff of a succeeding aircraft when the proceding aircraft has passed the point of runways intersection. When applicable, apply the procedure in 3-104.

Section 10. RADAR APPROACHES — *TERMINAL*

5-130 APPLICATION

a. Provide radar approaches in accordance with standard or special instrument approach procedures.

b. A radar approach may be given to any aircraft upon request and may be offered to aircraft in distress regardless of weather conditions or to expedite traffic.

5-130b Note. — Acceptance of a radar approach by a pilot does not waive the prescribed weather minima for the airport or for the particular aircraft operator concerned. The pilot is responsible for determining if the approach and landing are authorized under the existing weather minima.

5-131 APPROACH INFORMATION

a. Issue the following information to an aircraft that will conduct a radar approach. Current approach information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS broadcast code. All items listed below, except for (3), may be omitted after the first approach if repeated approaches are made and no change has occurred.

5-131a Reference. — Approach Information by Approach Control Facilities, 4-72.

(1) Altimeter setting.

(2) Ceiling and visibility if ceiling at the airport of intended landing is reported below 1,000 feet, or below the highest circling minimum, whichever is greater, or if the visibility is less than 3 miles.

(3) Issue any known changes classified as special weather observations as soon as possible. Special weather observations need not be issued after they are included in the ATIS broadcast and the pilot states the appropriate ATIS broadcast code.

(4) Pertinent information on known airport conditions if they are considered necessary to the safe operation of the aircraft concerned.

(5) Lost communication procedures as specified in 5-133.

b. Before starting final approach:

5-131b Note 1. — ASR approach procedures may be prescribed for specific runways, for an airport/heliport, and for helicopters only to a "point-in-space," i.e., a MAP from which a helicopter must be able to proceed to the landing area by visual reference to a prescribed surface route.

5-131b Note 2. — Occasionally, copter PAR approaches are available to runways where conventional PAR approaches have been established. In those instances where the two PAR approaches serve the same runway, the copter approach will have a steeper glide slope and a lower decision height. By the controller's designating the approach to be flown, the helicopter pilot understands which of the two approaches he has been vectored for and which set of minima apply.

(1) Inform the aircraft of the type of approach, runway, airport, heliport, or other point, as appropriate, to which the approach will be made. Specify the airport name when the approach is to a secondary airport.

Phraseology:

THIS WILL BE A PAR/SURVEILLANCE APPROACH TO:

RUNWAY (runway number),

or

(airport name) AIRPORT, RUNWAY (runway number)

or

(airport name) AIRPORT/HELIPORT.

THIS WILL BE A COPTER PAR APPROACH TO:

RUNWAY (runway number),

or

(airport name) AIRPORT, RUNWAY (runway number),

or

(airport name) AIRPORT/HELIPORT.

(2) For surveillance approaches, specify the location of the MAP in relation to the runway/airport/heliport.

Phraseology:

MISSED APPROACH POINT IS (distance) MILE/S FROM RUNWAY/AIRPORT/HELIPORT,

or, for a Point-In-Space Approach

A MISSED APPROACH POINT (distance) MILE/S (direction from landing area) OF (airport name) AIRPORT/HELIPORT.

5-131b(1) and (2) Example. — Helicopter Point-in-Space Approach:

"Army Copter Zulu Two, this will be a surveillance approach to a missed approach point, three point five miles south of Creedon Heliport."

5-131b Reference. — Elevation failure, 5-168.

c. Inform an aircraft making an approach to an airport not served by a tower that no traffic or landing runway information is available for that airport.

Phraseology:

NO TRAFFIC OR LANDING RUNWAY INFORMATION AVAILABLE FOR THE AIRPORT.

5-132 NO-GYRO APPROACH

When an aircraft will make a no-gyro surveillance or PAR approach:

a. Before issuing a vector, inform the aircraft of the type of approach.

Phraseology:

THIS WILL BE A NO-GYRO SURVEILLANCE/PAR APPROACH.

b. Instruct the aircraft when to start and stop turn.

Phraseology:

TURN LEFT/RIGHT.

STOP TURN.

c. After turn on to final approach has been made and prior to the aircraft reaching the approach gate, instruct the aircraft to make half-standard rate turns.

Phraseology:

MAKE HALF-STANDARD RATE TURNS.

5-133 LOST COMMUNICATIONS

USA/USAF/USN NOT APPLICABLE

When weather reports indicate that an aircraft will likely encounter IFR weather conditions during the approach, take the following action as soon as possible after establishing radar identification and radio communications (may be omitted after the first approach when successive approaches are made and the instructions remain the same):

5-133 Note. — Where a military air traffic control facility provides radar approach control services for a civil airport, civilian aircraft will be given specific lost communications procedures when lost communications instructions are required.

a. If lost communications instructions will require the aircraft to fly on an unpublished route, issue an appropriate altitude to the pilot. If the lost communications instructions are the same for both pattern and final, the pattern/vector controller shall issue both. Advise the pilot that if radio communications are lost for a specified time interval (not more than 1 minute) on vector to final approach, 15 seconds on a surveillance final approach, or 5 seconds on a PAR final approach to:

(1) Attempt contact on a secondary, or tower frequency.

(2) Proceed in accordance with visual flight rules, if possible.

(3) Proceed with an approved nonradar approach, or execute the specific lost communications procedure for the radar approach being used.

5-133a(3) Note. — The approved procedures are those published on the FAA Forms 8260 or applicable military document.

Phraseology:

IF NO TRANSMISSIONS ARE RECEIVED FOR (time interval) IN THE PATTERN OR FIVE/FIFTEEN SECONDS ON FINAL APPROACH, ATTEMPT CONTACT ON (frequency), AND

if possibility exists,

PROCEED VFR. IF UNABLE:

if approved,

PROCEED WITH (nonradar approach), MAINTAIN (altitude) UNTIL ESTABLISHED ON/OVER/FIX/NAVAID/APPROACH PROCEDURE,

or

(alternative instructions).

USN

Phraseology:

(For ACLS operations using Mode I, IA, and II). IF NO TRANSMISSIONS ARE RECEIVED FOR FIVE SECONDS AFTER LOSS OF DATA LINK, ATTEMPT CONTACT ON (frequency), AND

if possibility exists,

PROCEED VFR. IF UNABLE:

if approved,

PROCEED WITH (nonradar approach), MAINTAIN (altitude) UNTIL ESTABLISHED ON/OVER FIX/NAVAID/APPROACH PROCEDURE,

or

(alternative instructions).

b. If the final approach lost communications instructions are changed, differ from those for the pattern, or are not issued by the pattern controller, they shall be issued by the final controller.

c. If the pilot states that he cannot accept a lost communications procedure due to weather conditions or other reasons, request the pilot's intention.

5-133c Note. — The pilot is responsible for determining the adequacy of lost communications procedures with respect to aircraft performance, equipment capability, or reported weather.

5-134 RADAR CONTACT LOST

If radar contact is lost during an approach and the aircraft has not started final approach, clear the aircraft to an appropriate NAVAID/fix for an instrument approach.

5-135 LANDING CHECK

USA/USN

Advise the pilot to perform landing check while the aircraft is on downwind leg and in time to complete it before turning base leg. If an incomplete pattern is used, issue this before handoff to the final controller for a PAR approach, or before starting descent on final approach for surveillance approach.

Phraseology:

PERFORM LANDING CHECK

5-136 POSITION INFORMATION

Inform the aircraft of its position at least once before starting final approach.

Phraseology:

(Number) MILES (direction) OF AIRPORT,

or

DOWNWIND/BASE LEG (number) MILES (direction) OF AIRPORT.

5-137 FINAL CONTROLLER CHANGEOVER

When instructing the aircraft to change frequency for final approach guidance, include the name of the facility.

Phraseology:

CONTACT (name of facility) FINAL CONTROLLER ON (frequency).

5-138 COMMUNICATIONS CHECK

On initial contact with the final controller, ask the aircraft for a communication check.

Phraseology:

(Aircraft call sign), (name of facility) FINAL CONTROLLER.

HOW DO YOU HEAR ME?

5-139 TRANSMISSION ACKNOWLEDGMENT

After contact has been established with the final controller and while on the final approach course, instruct the aircraft not to acknowledge further transmissions.

Phraseology:

DO NOT ACKNOWLEDGE FURTHER TRANSMISSIONS.

5-140 WHEELS DOWN CHECK

USA/USAF/USN

Before the aircraft starts descent on final approach, remind the pilot that wheels should be down unless he has previously reported wheels down.

Phraseology:

WHEELS SHOULD BE DOWN.

5-140 Note. — The intent is solely to remind the pilot to lower the wheels; not to place responsibility on the controller.

5-141 MISSED APPROACH

USAF NOT APPLICABLE

Before an aircraft starts final descent for a full stop landing and weather reports indicate that any portion of the final approach will be conducted in IFR conditions, issue a specific missed approach procedure approved for the radar approach being conducted.

Phraseology:

YOUR MISSED APPROACH PROCEDURE IS (missed approach procedure).

5-141 Note. — The specific missed approach procedure is published on FAA Form 8260-4 or applicable military document.

5-142 LOW APPROACH AND TOUCH-AND-GO

Before an aircraft which plans to execute a low approach or touch-and-go begins final descent, issue appropriate departure instructions to be followed upon completion of the approach. Climb-out instructions must include a specific heading and altitude except when the aircraft will maintain VFR and contact the tower.

Phraseology:

AFTER COMPLETING LOW APPROACH/

TOUCH AND GO:

CLIMB AND MAINTAIN (altitude).

TURN (right or left) HEADING (degrees)/FLY RUNWAY HEADING,

or

MAINTAIN VFR, CONTACT TOWER,

or

(other instructions as appropriate).

5-142 Note. — This may be omitted after the first approach if instructions remain the same.

5-143 TOWER CLEARANCE

a. When an aircraft is on final approach to an airport served by a tower, obtain a clearance to land, touch-and-go, or make low approach. Issue the clearance and the surface wind to the aircraft.

b. If the clearance is not obtained or is cancelled, inform the aircraft and issue alternative instructions.

Phraseology:

TOWER CLEARANCE CANCELLED/NOT RECEIVED (alternative instructions).

5-144 FINAL APPROACH ABNORMALITIES

Instruct the aircraft if runway environment not in sight, execute a missed approach if previously given; or climb to or maintain a specified altitude and fly a specified course whenever the completion of a safe approach is questionable because one or more of the following conditions exists. The conditions in a., b., and c., below do not apply after the aircraft passes decision height on a PAR approach.

5-144 Examples —

Examples of reasons for issuing missed approach instructions:

"Radar contact lost."

"Too high/low for safe approach."

"Too far right/left for safe approach."

5-144 Reference. — Position Advisories, 5-166.

a. Safety limits are exceeded or radical target deviations are observed.

b. Position or identification of the aircraft is in doubt.

c. Radar contact is lost or a malfunctioning radar is suspected.

Phraseology:

(Reason) IF RUNWAY/APPROACH LIGHTS/RUNWAY LIGHTS NOT IN SIGHT, EXECUTE MISSED APPROACH/(alternative instructions).

5-144c Note. — If the pilot requests, approval may be granted to proceed with the approach via ILS or other navigational aid.

5-144c Reference. — Radar Contact Lost, 5-134.

d. Airport conditions or traffic preclude approach completion.

Phraseology:

EXECUTE MISSED APPROACH/(alternative instructions). (Reason).

5-145 thru 5-149 RESERVED

I

Section 11. SURVEILLANCE APPROACHES — *TERMINAL*

5-150 ALTITUDE INFORMATION

Provide recommended altitudes on final approach if the pilot requests. If recommended altitudes are requested, inform the pilot that recommended altitudes which are at or above the published MDA will be given for each mile on final.

5-150 Reference. — Facility managers refer to Order 7210.3 — 1246, Recommended Altitudes for Surveillance Approaches.

5-151 VISUAL REFERENCE REPORT

Aircraft may be requested to report the runway, approach/runway lights, or airport in sight. Helicopters making a "point-in-space" approach may be requested to report when able to proceed to the landing area by visual reference to a prescribed surface route.

Phraseology:

REPORT (runway, approach/runway lights or airport) IN SIGHT.

REPORT WHEN ABLE TO PROCEED VISUALLY TO AIRPORT/HELIPORT.

5-152 DESCENT NOTIFICATION

a. Issue advance notice of where descent will begin and issue the straight-in MDA prior to issuing final descent for the approaches.

5-152a Note. — The point at which descent to the minimum descent altitude is authorized is the final approach fix unless an altitude limiting stepdown-fix is prescribed.

b. When it is determined that the surveillance approach will terminate in a circle to land maneuver, request the aircraft approach category from the pilot. After receiving the aircraft approach category, provide him with the applicable circling MDA prior to issuing final descent for the approach.

5-152b Note. — Pilots are normally expected to furnish the aircraft approach category to the controller when it is determined that the surveillance approach will terminate in a circle to land maneuver. If this information is not voluntarily given, solicit the aircraft approach category from the pilot and then issue him the applicable circling MDA.

Phraseology:

PREPARE TO DESCEND IN (number) MILE/S.

For straight-in approaches

PUBLISHED MINIMUM DESCENT ALTITUDE (altitude).

For circling Approaches

REQUEST YOUR AIRCRAFT APPROACH CATEGORY. (Upon receipt of aircraft approach category), PUBLISHED CIRCLING MINIMUM DESCENT ALTITUDE (altitude).

5-153 DESCENT INSTRUCTIONS

When an aircraft reaches the descent point, issue one of the following, as appropriate:

5-153 Reference. — Elevation Failure, 5-168.

a. Unless a descent restriction exists, advise the aircraft to descend to the MDA.

Phraseology:

(Number) MILES FROM RUNWAY/AIRPORT/HELIPORT. DESCEND TO YOUR MINIMUM DESCENT ALTITUDE.

b. When a descent restriction exists, specify the prescribed restriction altitude. When the aircraft has passed the altitude limiting point, advise to continue descent to MDA.

Phraseology:

(Number) MILES FROM RUNWAY/AIRPORT/HELIPORT. DESCEND AND MAINTAIN (restriction altitude).

DESCEND TO YOUR MINIMUM DESCENT ALTITUDE.

5-154 FINAL APPROACH GUIDANCE

a. Issue course guidance, inform the aircraft when it is on-course, and frequently inform the aircraft of any deviation from course.

Phraseology:

HEADING (heading),

ON-COURSE,

or

SLIGHTLY/WELL LEFT/RIGHT OF COURSE.

5-154a Note. — Controllers should not key the radio transmitter continuously during radar approaches to preclude a lengthy communications block. The decision on how often transmitters are unkeyed is the controller's prerogative.

b. Issue trend information, as required, to indicate target position with respect to the extended runway centerline and to describe the target movement as appropriate corrections are issued. Trend information may be modified by the terms "RAPIDLY" AND "SLOWLY", as appropriate.

5-154b Examples. —

"Going left/right of course." "Left/right of course and holding/correcting."

c. Inform the aircraft of its distance from the runway, airport/heliport or MAP, as appropriate, each mile on final.

Phraseology:

(Number) MILE/S FROM RUNWAY/AIRPORT/ HELIPORT OR MISSED APPROACH POINT.

d. Recommended altitudes shall be furnished, if requested, in accordance with 5-150.

Phraseology:

If requested,

ALTITUDE SHOULD BE (altitude).

5-155 APPROACH GUIDANCE TERMINATION

a. Discontinue surveillance approach guidance when:

(1) Requested by the pilot.

(2) In your opinion, continuation of a safe approach to the MAP is questionable.

(3) The aircraft is over the MAP.

b. *USAF NOT APPLICABLE:* Surveillance approach guidance may be discontinued when the pilot reports the runway or approach/runway lights in sight or if a "point-in-space" approach, he reports able to proceed to the landing area by visual reference to a prescribed surface route.

c. When approach guidance is discontinued in accordance with a. above and the aircraft has reported the runway or approach/runway lights in sight, advise the aircraft of its position and to proceed visually.

Phraseology:

(Distance) MILE/S FROM RUNWAY/AIRPORT/ HELIPORT

or

OVER MISSED APPROACH POINT.

PROCEED VISUALLY (additional instructions/ clearance as required).

d. When approach guidance is discontinued in accordance with a. above and the aircraft has not reported the runway or approach/runway lights in sight, advise the aircraft of its position and to execute a missed approach unless the runway or approach/runway lights are in sight or, if a "point-in-space" approach, unless able to proceed visually.

Phraseology:

(Distance) MILE/S FROM RUNWAY,

or

OVER MISSED APPROACH POINT.

IF RUNWAY,

or

APPROACH/RUNWAY LIGHTS NOT IN SIGHT, EXECUTE MISSED APPROACH/(missed approach instructions). (Additional instructions/ clearance, as required).

(Distance and direction) FROM AIRPORT/HELIPORT/MISSED APPROACH POINT.

IF UNABLE TO PROCEED VISUALLY, EXECUTE MISSED APPROACH. (Additional instructions/clearance, if required).

5-155d Note. — Terminal Instrument Approach Procedures and Flight Inspection criteria require establishment of a MAP for each procedure including the point to which satisfactory radar guidance can be provided.

5-156 thru 5-159 RESERVED

Section 12. PAR APPROACHES — *TERMINAL*

5-160 GLIDEPATH NOTIFICATION

Inform the aircraft when it is approaching glidepath (approximately 10 to 30 seconds before final descent).

Phraseology:

APPROACHING GLIDEPATH.

5-161 DECISION HEIGHT (DH) NOTIFICATION

Provide the DH to any pilot who requests it.

Phraseology:

PUBLISHED DECISION HEIGHT (number of feet).

5-162 DESCENT INSTRUCTION

When an aircraft reaches the point where final descent is to start, instruct it to begin descent.

Phraseology:

BEGIN DESCENT.

5-163 GLIDEPATH AND COURSE INFORMATION

a. Issue course guidance and inform the aircraft when it is on glidepath and on course, and frequently inform the aircraft of any deviation from glidepath or course.

Phraseology:

HEADING (heading).

ON GLIDEPATH.

ON COURSE,

or

SLIGHTLY/WELL ABOVE/BELOW GLIDEPATH.

SLIGHTLY/WELL LEFT/RIGHT OF COURSE.

5-163a Note. — Controllers should not key the radio transmitter continuously during radar approaches to preclude a lengthy communications block. The decision on how often transmitters are unkeyed is the controller's prerogative.

b. Issue trend information as required, to indicate target position with respect to the azimuth and elevation cursors and to describe target movement as appropriate corrections are issued. Trend information may be modified by the terms "RAPIDLY or "SLOWLY", as appropriate.

5-163b Examples. —

"Going above/below glidepath."

"Going right/left of course."

"Above/below glidepath and coming down/up."

"Above/below glidepath and holding."

"Left/right of course and holding/correcting."

5-164 DISTANCE FROM TOUCHDOWN

Inform the aircraft of its distance from touchdown at least once each mile on final approach.

Phraseology:

(Number of miles) MILES FROM TOUCHDOWN.

5-165 DECISION HEIGHT

Inform the aircraft when it reaches the published decision height.

Phraseology:

AT DECISION HEIGHT.

5-166 POSITION ADVISORIES

a. Continue to provide glidepath and course information prescribed in 5-163a. and b. until the aircraft passes over threshold.

5-166 Note. — Glidepath and course information provided below decision height is advisory only. FAR 91.117 outlines pilot responsibilities for descent below decision height.

b. Inform the aircraft when it is passing over the approach lights.

Phraseology:

OVER APPROACH LIGHTS.

c. Inform the aircraft when it is passing over the landing threshold and inform it of its position with respect to the final approach course.

Phraseology:

OVER LANDING THRESHOLD, (position with respect to course).

5-167 COMMUNICATION TRANSFER

Issue communications transfer instructions.

Phraseology:

CONTACT (terminal control function) (frequency, if required) AFTER LANDING.

5-167 Note. — Communications transfer instructions should be delayed slightly until the aircraft is on the landing roll-out to preclude diversion of the pilot's attention during transition and touchdown.

5-167 Reference. — Radio Communications Transfer, 2-17.

5-168 ELEVATION FAILURE

a. If the elevation portion of PAR equipment fails during a precision approach:

(1) Discontinue PAR instructions and tell the aircraft to take over visually or, if unable, to execute a missed approach. If the aircraft executes a missed approach, apply (2) below.

Phraseology:

NO GLIDEPATH INFORMATION AVAILABLE. IF RUNWAY, APPROACH/RUNWAY LIGHTS NOT IN SIGHT, EXECUTE MISSED APPROACH/(alternative instructions).

(2) If a surveillance approach, ASR or PAR without glide slope, is established for the same runway, inform the aircraft that a surveillance approach can be given. Use ASR or the azimuth portion of the PAR to conduct the approach and apply Section 11 of this chapter. When the PAR azimuth is used, inform the pilot that mileage information will be from touchdown and at those runways where specific minima have been established for PAR without glide slope. Inform the pilot that the PAR azimuth will be used for the approach.

5-168a(2) Examples. —

a. Approach information when PAR azimuth used:

"This will be a surveillance approach to Runway Three Six. Mileages will be from touchdown," or

"This will be a surveillance approach to Runway Three Six using PAR azimuth. Mileages will be from touchdown."

b. Descent instructions:

"Five miles from touchdown, descend to your minimum descent altitude/minimum altitude."

5-168a(2) Reference. — Approach Information 5-131; Descent Instructions, 5-153.

b. If the elevation portion of the PAR equipment is inoperative before starting a precision approach, apply a. (2) above.

5-169 SURVEILLANCE UNUSABLE

PAR approaches may be conducted when the ASR is unusable provided a nonradar instrument approach will position the aircraft over a navigational aid or DME fix within the precision radar coverage, or an adjacent radar facility can provide a direct radar handoff to the PAR controller.

5-169 Note. — The display of the NAVAID or DME fix in accordance with 5-51b. is not required provided the NAVAID or DME fix can be correlated on a PAR scope.

5-170 thru 5-179 RESERVED

Section 13. USE OF PAR FOR APPROACH MONITORING — *TERMINAL*

5-180 MONITOR ON PAR EQUIPMENT

Aircraft conducting precision or nonprecision approaches shall be monitored by PAR equipment if the PAR final approach course coincides with the NAVAID final approach course from the final approach fix to the runway and one of the following conditions exists:

5-180 Note 1. — The provisions of this Section do not apply to monitoring simultaneous ILS Approaches.

5-180 Note 2. — This procedure is used in PAR facilities operated by the FAA and the military services at joint-use civil/military locations and military installations during the operational hours of the PAR.

a. The reported weather is below basic VFR minima. *(USAF:* When reported weather is below 1,500 feet or 3 miles.)

b. *USA NOT APPLICABLE.* At night.

c. Upon request of the pilot.

5-181 MONITOR AVAILABILITY

a. Inform the aircraft of the frequency on which monitoring information will be transmitted if it will not be the same as the communication frequency used for the approach.

Phraseology:

RADAR MONITORING ON LOCALIZER VOICE (frequency),

and, if applicable

CONTACT (terminal control function) (frequency, if required) AFTER LANDING.

b. If the approach is not monitored, inform the aircraft that radar monitoring is not available.

Phraseology:

RADAR MONITORING NOT AVAILABLE.

c. If conditions prevent continued monitor after the aircraft is on final approach, advise the pilot. State the reason and issue alternate procedures as appropriate.

Phraseology:

(Reason), RADAR MONITORING NOT AVAILABLE, (alternative instructions).

5-181c Note. — Approach monitoring is a vital service, but during the approach, the controller acts primarily as a safety observer and does not actually guide the aircraft. Loss of the radar monitoring capability (and thus availability) is no reason to terminate an otherwise good instrument approach. Advise the pilot that radar contact has been lost (or other reason as appropriate), that radar monitoring is not available, and of actions for the pilot to take in either proceeding with or breaking off the approach; i.e., contact tower, remain on PAR frequency, etc.

5-182 MONITOR INFORMATION

When approaches are monitored, take the following action:

a. Advise the pilot executing a nonprecision approach that glidepath advisories are not provided. Do this prior to the pilot beginning his final descent.

Phraseology:

GLIDEPATH ADVISORIES WILL NOT BE PROVIDED.

b. Inform the aircraft when passing final approach fix.

Phraseology:

PASSING (fix).

c. Advise the pilot of glidepath trend information (precision approaches) and course trend information to indicate target position and movement with respect to the elevation or azimuth cursor when the aircraft target corresponds to a position of well above/below the glidepath or well left/right of course and whenever the aircraft exceeds the radar safety limits. Repeat if no correction is observed.

5-182c Examples. —

Course trend information: "(Ident), well right/left of PAR course, drifting further right/left."

Glidepath trend information: "(Ident), well above/below PAR glidepath."

5-182c Reference. — Glidepath and Course Information, 5-163b.

d. If, after repeated advisories, the aircraft is observed proceeding outside the safety limits or a radical target deviation is observed, advise the aircraft if unable to proceed visually, execute a missed approach. Issue a specific altitude and heading if a procedure other than the published missed approach is to be executed.

Phraseology:

(Position with respect to course or glidepath). IF NOT VISUAL, ADVISE YOU EXECUTE MISSED APPROACH (alternative instructions).

e. Provide monitor information until the aircraft is over the landing threshold or commences a circling approach.

5-183 WHEELS DOWN CHECK

USA/USAF/USN

Before the aircraft starts descent on final approach, remind the pilot that wheels should be down unless he has previously reported wheels down.

Phraseology:

WHEELS SHOULD BE DOWN.

5-183 Note. — The intent is solely to remind the pilot to lower the wheels; not to place responsibility on the controller.

5-184 thru 5-189 RESERVED

Section 14. AUTOMATION — *EN ROUTE*

5-190 CONFLICT ALERT

a. When a conflict alert is displayed, evaluate the reason for the alert without delay and take appropriate action.

5-190a Reference. — Safety Advisory, 2-6.

b. If another controller is involved in the alert, initiate coordination to ensure an effective course of action. Coordination is not required when immediate action is dictated.

c. Suppressing/Inhibiting Conflict Alert.

(1) The controller may suppress the display of a Conflict Alert from a control position with the application of one of the following suppress/inhibit computer functions:

(a) The Conflict Suppress (CO) function may be used to suppress the CA display between specific aircraft for a specific alert.

(b) The Group Suppression (GS) function shall be applied exclusively to inhibit the displaying of alerts among military aircraft engaged in special military operations where standard en route separation criteria do not apply.

5-190c(1) Note. — Special military operations where the GS function would typically apply involve those activities where military aircraft routinely operate in proximities to each other that are less than standard en route separation criteria (i.e., air refueling operations, ADC practice intercept operations.)

(2) Computer entry of a message suppressing a Conflict Alert constitutes acknowledgment for the alert and signifies that appropriate action has or will be taken.

(3) Conflict Alert may not be suppressed or inhibited at or for another control position without being coordinated.

5-191 EN ROUTE MINIMUM SAFE ALTITUDE WARNING (E-MSAW)

a. When an E-MSAW alert is displayed, immediately analyze the situation and, if necessary, take the appropriate action to resolve the alert.

5-191a Note. — Caution should be exercised when issuing a clearance to an aircraft in reaction to an E-MSAW alert to ensure that adjacent MIA areas are not a factor.

5-191a Reference. — Safety Advisory, 2-6.

b. The controller may suppress the display of an E-MSAW alert from his control position with the application of one of the following suppress/inhibit computer functions:

(1) The Specific Alert Suppression message may be used to inhibit the E-MSAW alerting display on a single flight for a specific alert.

(2) The Indefinite Alert Suppression message shall be used exclusively to inhibit the display of E-MSAW alerts on aircraft known to be flying at an altitude that will activate the alert feature of one or more MIA areas within an ARTCC.

5-191b(2) Note 1. — The Indefinite Suppression message will remain in effect for the duration of the referenced flight's active status within the ARTCC unless modified by controller action.

5-191b(2) Note 2. — The Indefinite Suppression message would typically apply to military flights with clearance to fly low-level type routes that routinely require altitudes below established minimum IFR altitudes.

c. Computer entry of a message suppressing or inhibiting E-MSAW alerts constitutes acknowledgment for the alert and indicates that appropriate action has or will be taken to resolve the situation.

5-192 COMPUTER ENTRY OF ASSIGNED ALTITUDE

The data block shall always reflect the current status of the aircraft, unless otherwise specified in a facility directive. Whenever an aircraft is cleared to maintain an altitude different from that in the flight plan data base, enter into the computer one of the following:

5-192 Note. — A facility directive may be published deleting the interim altitude computer entry requirements of 5-192b. The directive would apply to those conditions where heavy traffic or sector complexity preclude meeting these entry requirements.

5-192 Reference. — Order 7210.3-1025, Waiver of Interim Altitude Requirements.

a. The new assigned altitude if the aircraft will (climb or descend to and) maintain the new altitude, or

b. An interim altitude if the aircraft will (climb or descend to and) maintain the new altitude for a short period of time and subsequently be recleared to the altitude in the flight plan data base or a new altitude or a new interim altitude.

5-192b Note. — Use of the interim altitude function will ensure that the data block reflects the actual status of the aircraft and eliminate superfluous altitude updates.

5-193 ENTRY OF REPORTED ALTITUDE

Except in EARTS, whenever Mode C altitude information is either not available or is unreliable, enter reported altitudes into the computer as follows:

5-193 Note. — Altitude updates are required to assure maximum accuracy in applying slant range correction formulas.

a. When an aircraft reaches the assigned altitude.

b. When an aircraft at an assigned altitude is issued a clearance to climb or descend.

c. A minimum of each 10,000 feet during climb to or descent from FL 180 and above.

5-194 SELECTED ALTITUDE LIMITS

To ensure the display of Mode C targets and data blocks, take the following actions:

5-194 Note. — Exception to these requirements may be authorized for specific altitudes in certain center sectors if defined in appropriate facility directives and approved by the Regional AT Division Manager.

a. NAS En Route Stage A:

(1) Display altitude limits in the "R" CRD to include, as a minimum, the altitude stratum of the sector, and

(2) Select the display filter keys on the PVD that include, as a minimum, the altitude stratum of the sector plus:

(a) 1,200 feet above the highest and below the lowest altitude or flight level of the sector where 1,000 feet vertical separation is applicable, and

(b) 2,200 feet above the highest and below the lowest flight level of the sector where, 2,000 feet vertical separation is applicable.

b. En Route Automated Radar Tracking System (EARTS). Select altitude filter limits to include, as a minimum, the altitude stratum of the sector display.

c. Direct Access Radar Channel (DARC):

(1) Display altitude limits on the PVD to include, as a minimum, the altitude stratum of the sector, and

(2) Select the display filter keys on the PVD that include, as a minimum, the altitude stratum of the sector plus:

(a) 1,200 feet above the highest and below the lowest altitude or flight level of the sector where 1,000 feet vertical separation is applicable, and

(b) 2,200 feet above the highest and below the lowest flight level of the sector where 2,000 feet vertical separation is applicable.

5-195 SECTOR ELIGIBILITY

The use of the OK function is allowed to override sector eligibility only when one of the following conditions is met:

a. Prior coordination is effected.

b. The flight is within the control jurisdiction of the sector.

5-196 COAST TRACKS

Do not use coast tracks in the application of either radar or nonradar separation criteria.

5-197 CONTROLLER INITIATED COAST TRACKS

a. Initiate coast tracks only in Flight Plan Aided Tracking (FLAT) mode, except "free" coast tracking may be used as a reminder that aircraft without corresponding computer stored flight plan information are under your control.

5-197a Note. — To ensure tracks are started in FLAT mode, perform a start track function at the aircraft's most current reported position, then immediately "force" the track into coast tracking by performing another start function with "CT" option in field 64. Making amendments to the stored route with trackball entry when the aircraft is rerouted, and repositioning the data block to coincide with the aircraft's position reports are methods of maintaining a coast track in FLAT mode.

b. Prior to initiating a coast track, ensure the following:

(1) A departure message or progress report corresponding with aircraft's current position is entered into the computer.

(2) The track being started is within Posted Time Update Interval (PTUI) of the aircraft's computer-estimated position and Flight Plan Track Position Difference (FTPD) distance of the aircraft's flight plan route.

5-197b(2) Note. — FTPD is an automation parameter, normally set to 15 miles, that is compared with the tracked target's perpendicular distance from the stored flight plan route. If the track is within the parameter miles, it is eligible for "FLAT Tracking." PTUI is an automation parameter, normally set to 3 minutes, that is compared against the difference between the calculated time of arrival and the actual time of arrival over a fix. If the difference is greater than PTUI, the flight plan's stored data will be revised and fix-time update messages will be generated.

c. As soon as practicable after the aircraft is in radar surveillance, initiate action to cause radar tracking to begin on the aircraft.

5-198 thru 5-209 RESERVED

Section 15. AUTOMATED RADAR TERMINAL SYSTEMS (ARTS) — *TERMINAL*

5-210 APPLICATION

ARTS may be used for identifying aircraft assigned a discrete beacon code, maintaining identity of targets, and performing handoffs of these targets between controllers.

5-210 Note. — *USAF/USN:* Where PIDP/DAIR equipment is capable of performing the functions described in this section, it may be used accordingly.

5-211 RESPONSIBILITY

This equipment does not relieve the controller of the responsibility to ensure proper identification, maintenance of identity, handoff of the correct target associated with the alphanumeric data, and separation of aircraft.

5-212 FUNCTIONAL USE

In addition to other uses specified herein, terminal automation may be used for the following functions:

a. Tracking (ARTS III and IIIA).

b. Tagging (ARTS II).

c. Handoff (ARTS II, III, and IIIA).

d. Altitude information (ARTS II, III, and IIIA).

e. Coordination (ARTS II, III, and IIIA).

f. Ground speed (ARTS III and IIIA).

g. Identification.

5-213 SYSTEM REQUIREMENTS

Use the ARTS systems as follows:

5-213 Note. — Locally developed procedures, operating instructions, and training material are required because of differences in equipment capability. Such locally developed procedures shall be supplemental to those contained in this section and shall be designed to make maximum use of the ARTS equipment.

a. Inform all appropriate positions before terminating or reinstating use of the ARTS system at a control position. When terminating the use of ARTS, all pertinent flight data of that position shall be transferred or terminated.

b. Inform other interfaced facilities of scheduled and unscheduled shutdowns.

c. Initiate a track/tag on all aircraft to the maximum extent possible. As a minimum, aircraft identification should be entered and automated handoff functions should be used.

d. Assigned altitude, if displayed, shall be kept current at all times. Climb and descent arrows, where available, shall be used to indicate other than level flight.

e. Do not use the automatic altitude readout of an aircraft under another controller's jurisdiction for vertical separation purposes without verbal coordination.

5-214 INFORMATION DISPLAYED

a. Two-letter ICAO designators or three letter designators, as appropriate, shall be used unless program limitations dictate the use of a single letter alpha prefix.

b. Use of the inhibit select switches to remove displayed information no longer required shall be in accordance with local directives which should ensure maximum required use of the equipment.

c. Information displayed in the ATIS, General Information, and Scratch Pad areas shall be in accordance with local directives.

5-215 CONFLICT ALERT

a. When a conflict alert is displayed, evaluate the reason for the alert without delay and take appropriate action.

5-215a Reference. — Safety Advisory, 2-6.

b. If another controller is involved in the alert, initiate coordination to ensure an effective course of action. Coordination is not required when immediate action is dictated.

c. Suppressing/Inhibiting Conflict Alert.

(1) The suppress function may be used to suppress the display of a specific Conflict Alert.

(2) The inhibit function shall only be used to inhibit the display of Conflict Alert for aircraft routinely engaged in operations where standard separation criteria do not apply.

5-215c(2)(b) Note. — Examples of operations where standard separation criteria do not apply are ADC practice intercept operations and air shows.

(3) Computer entry of a message suppressing a Conflict Alert constitutes acknowledgment for the alert and signifies that appropriate action has or will be taken.

(4) Conflict Alert may not be suppressed or inhibited at or for another control position without being coordinated.

5-216 INHIBITING MINIMUM SAFE ALTITUDE WARNING (MSAW)

a. Assign a beacon code to VFR aircraft to inhibit MSAW processing unless the aircraft has specifically requested MSAW. Inhibit MSAW processing for an aircraft which has cancelled its IFR

flight plan but has not requested MSAW processing.

b. A low altitude alert may be suppressed from the control position. Computer entry of the suppress message constitutes an acknowledgment for the alert and indicates that appropriate action has or will be taken.

5-217 TRACK SUSPEND FUNCTION

Use the track suspend function only when data block overlap in holding patterns or in proximity of the final approach create an unworkable situation. If necessary to suspend tracks, those which are not displaying automatic altitude readouts shall be suspended. If the condition still exists, those displaying automatic altitude readouts may then be suspended.

5-218 thru 5-219 RESERVED

Section 16. TPX-42 — *TERMINAL*

5-220 APPLICATION

Each TPX-42 facility shall utilize the equipment to the maximum extent possible consistent with local operating conditions.

5-221 RESPONSIBILITY

This equipment does not relieve the controller of the responsibility to ensure proper identification, maintenance of identity, hand-off of the correct radar beacon target associated with numeric data, and the separation of aircraft.

5-222 FUNCTIONAL USE

TPX-42 may be used for the following functions:

a. Tagging.

b. Altitude information.

c. Coordination.

d. Target identity confirmation.

5-223 SYSTEM REQUIREMENTS

Use the TPX-42 system as follows:

a. TPX-42 facilities shall inform adjacent facilities of scheduled and unscheduled shutdowns.

b. To the maximum extent practicable, tags should be utilized for all controlled aircraft.

5-224 INFORMATION DISPLAYED

a. Inhibiting portions of the tag shall be in accordance with facility directives which shall ensure maximum required use of the equipment.

b. Mode C altitude information shall not be inhibited unless a ground malfunction causes repeated discrepancies of 300 feet or more between the automatic altitude readouts and pilot reported altitudes.

5-225 ALTITUDE FILTERS

Set altitude filters to display Mode C within each controller's area of responsibility by setting the altitude limits to encompass all altitudes under the controller's jurisdiction. Set upper limits no lower than 1,000 feet above the highest altitude for which the controller is responsible. Lower limits normally should encompass field elevation so that provisions of 2-6 and 5-37b.(3) may be applied. Air traffic managers may authorize temporary suspension of this requirement when clutter is excessive.

5-226 INHIBITING LOW ALTITUDE ALERT SYSTEM (LAAS)

Assign a beacon code to a VFR aircraft or to an aircraft that has canceled its IFR flight plan to inhibit LAAS processing unless the aircraft has specifically requested LAAS.

TABLE OF CONTENTS

Chapter 7. VISUAL

Page

Section 1. GENERAL

7-1 Positive Control Area Restrictions 7-1
7-2 VFR Conditions 7-1
7-3 Approach Control Service for VFR Arriving Aircraft 7-1
7-4 Visual Holding of VFR Aircraft 7-1
7-5—7-9 Reserved 7-1

Section 2. VISUAL SEPARATION

7-10 Visual Separation 7-2
7-11—7-19 Reserved 7-2

Section 3. VFR-ON-TOP

7-20 VFR-On-Top 7-3
7-21 Altitude for Direction of Flight 7-3
7-22—7-29 Reserved 7-3

Section 4. APPROACHES

7-30 Visual Approach 7-4
7-31 Visual Approaches — Radar 7-4
7-32 Clearance for Visual Approach — Radar 7-5
7-33 Multiple Runway Application (Visual) — Radar 7-5
7-34 Charted Visual Flight Procedures (CVFP) 7-5
7-35 Contact Approach 7-6
7-36—7-39 Reserved 7-6

Section 5. SPECIAL VFR

7-40 Authorization 7-7
7-41 Priority 7-7
7-42 Separation 7-7
7-43 Altitude Assignment 7-7
7-44 Local Operations 7-7
7-45 Climb to VFR 7-8
7-46 Ground Visibility Below One Mile 7-8
7-47 Flight Visibility Below One Mile 7-8
7-48 Special VFR Helicopter Separation 7-8
7-49 Local Procedures 7-8
7-50—7-59 Reserved 7-10

Section 6. BASIC RADAR SERVICE TO VFR AIRCRAFT — *TERMINAL*

7-60 Application 7-11
7-61—7-69 Reserved 7-11

Section 7. STAGE II SERVICE — *TERMINAL*

7-70 Application 7-12
7-71 Service Availability 7-12
7-72 Initial Contact 7-12
7-73 Identification 7-12
7-74 Holding 7-12
7-75 Approach Sequence 7-12
7-76 Sequencing 7-12
7-77 Control Transfer 7-12

TABLE OF CONTENTS—*Continued*

Page

7-78 Abandoned Approach 7-12
7-79 VFR Departure Information 7-13
7-80 Service Provided When Tower Is Inoperative 7-13
7-81—7-89 Reserved 7-13

Section 8. STAGE III SERVICE — *TERMINAL*

7-90 Application 7-14
7-91 Issuance of EFC 7-14
7-92 Separation 7-14
7-93 Helicopter Traffic 7-14
7-94 Altitude Assignments 7-14
7-95 Approach Interval 7-15
7-96 TRSA Departure Information 7-15
7-97 TCA Methods 7-15
7-98—7-99 Reserved 7-15

Section 9. AIRPORT RADAR SERVICE AREA (ARSA) SERVICE — *TERMINAL*

7-100 Application 7-16
7-101 Issuance of EFC 7-16
7-102 Separation 7-16
7-103 Helicopter Traffic 7-16
7-104 Altitude Assignments 7-16
7-105 Approach Interval 7-16
7-106 ARSA Departure Information 7-16

Chapter 7. VISUAL

Section 1. GENERAL

7-1 POSITIVE CONTROL AREA RESTRICTIONS

Do not apply visual separation or issue VFR or "VFR-on-top" clearances in positive control areas.

7-2 VFR CONDITIONS

a. You may clear aircraft to maintain "VFR conditions" if one of the following conditions exists:

(1) The pilot of an aircraft on an IFR flight plan requests a VFR climb/descent.

(2) *TERMINAL:* The clearance will result in noise abatement benefits where part of the IFR departure route does not conform to an FAA-approved noise abatement route or altitude.

(3) The pilot has requested a practice instrument approach and is not on an IFR flight plan.

Phraseology:

MAINTAIN VFR CONDITIONS.

MAINTAIN VFR CONDITIONS UNTIL (time or fix).

MAINTAIN VFR CONDITIONS ABOVE/BELOW (altitude).

CLIMB/DESCEND VFR,

and, if required,

BETWEEN (altitude) AND (altitude),

or

ABOVE/BELOW (altitude).

7-2a(3) Reference. — Practice Approaches, 4-90.

b. When, in your judgment, there is reason to believe that flight in VFR conditions may become impractical, issue an alternative clearance which will ensure separation from all other aircraft for which you have separation responsibility.

Phraseology:

IF UNABLE, (alternative procedure), AND ADVISE.

7-3 APPROACH CONTROL SERVICE FOR VFR ARRIVING AIRCRAFT

TERMINAL

Where procedures have been established for arriving VFR aircraft to contact approach control for landing information, issue the following:

a. Wind, runway, and altimeter setting at the airport of intended landing. This information may be omitted if contained in the ATIS broadcast and the pilot states the appropriate ATIS code or if the pilot uses the phrase, "have numbers."

7-3a Note. — Pilot use of "have numbers" does not indicate receipt of the ATIS broadcast.

b. Traffic information on a workload permitting basis.

c. Time or place at which the aircraft is to contact the tower on local control frequency for further landing information.

d. When an aircraft makes initial contact with the tower, you may suggest that it contact approach control for landing and traffic information.

7-4 VISUAL HOLDING OF VFR AIRCRAFT

TERMINAL

When it becomes necessary to hold VFR aircraft at visual holding fixes, take the following actions:

a. Clear aircraft to hold at selected, prominent geographical fixes which can be easily recognized from the air, preferably those depicted on sectional charts.

7-4a Note. — At some locations, VFR checkpoints are depicted on Sectional Aeronautical and Terminal Area Charts. In selecting geographical fixes, depicted VFR checkpoints are preferred unless the pilot exhibits a familiarity with the local area.

7-4a Reference. — Visual Holding Point, 4-54.

b. Issue traffic information to aircraft cleared to hold at the same fix.

Phraseology:

HOLD AT (location) UNTIL (time or other condition),

TRAFFIC (description) HOLDING AT (fix, altitude if known),

or

PROCEEDING TO (fix) FROM (direction or fix).

7-5 thru 7-9 RESERVED

Section 2. VISUAL SEPARATION

7-10 VISUAL SEPARATION

Aircraft may be separated by visual means, as provided in this paragraph, when other approved separation is assured before and after the application of visual separation. To ensure that other separation will exist, consider aircraft performance, routes of flight, and weather conditions. Weather conditions must allow the aircraft to remain within sight until other separation exists. Do not apply visual separation between successive departures when departure routes and/or aircraft performance preclude maintaining separation.

7-10 Reference. — Wake Turbulence Cautionary Advisories, 2-20; Traffic Advisories, 2-21; Visual Approaches, 7-30, 7-31; Glossary (Visual Approach, Visual Separation).

a. *TERMINAL:* You may apply visual separation between aircraft under your facility's control within the terminal area, provided:

(1) You are in communication with at least one of the aircraft involved or have the capability to communicate instantaneously as prescribed in paragraph 3-102a.(2), and

(2) You see the aircraft and maintain visual separation between them, or

(3) A pilot sees another aircraft and you instruct him to maintain visual separation from it as follows:

(a) Tell the pilot about the other aircraft including position, direction and, unless it is obvious, the other aircraft's intention.

(b) Obtain acknowledgment from the pilot that the other aircraft is in sight.

(c) Instruct the pilot to maintain visual separation from that aircraft.

(d) Advise the pilot if the radar targets appear likely to converge.

7-10a(3)(d) Note. — Issue this advisory in conjunction with the instruction to maintain visual separation, or thereafter if the controller subsequently becomes aware that the targets are merging.

(e) If the aircraft are on converging courses, inform the other aircraft of the traffic and that visual separation is being applied.

Phraseology:

TRAFFIC, (clock position and distance), (direction)-BOUND, (type of aircraft), (intentions and other relevant information).

If applicable,

ON CONVERGING COURSE.

DO YOU HAVE IT IN SIGHT?

If the answer is in the affirmative,

MAINTAIN VISUAL SEPARATION FROM THAT TRAFFIC.

If aircraft are on converging courses, advise the other aircraft:

TRAFFIC, (clock position and distance), (direction)-BOUND, (type of aircraft). HAS YOU IN SIGHT AND WILL MAINTAIN VISUAL SEPARATION.

b. *EN ROUTE:* You may use visual separation in conjunction with visual approach procedures.

7-10b Reference. — Visual Approaches, 7-30, 7-31.

c. You may authorize a nonapproach control tower to provide visual separation between two aircraft within a control zone provided other separation is assured before and after the application of visual separation. Visual separation may be authorized between:

(1) An arriving and a departing aircraft when the tower has the arrival in sight.

(2) A departure and a departure when weather is at or above VFR minima.

(3) An arrival and an arrival provided the tower has both aircraft in sight and visual separation can be applied.

Phraseology:

VISUAL SEPARATION APPROVED BETWEEN (identification) AND (identification),

and for departing aircraft

(departing/ succeeding aircraft) RELEASED YOUR DISCRETION.

7-10c Note. — Separation of IFR aircraft before and after application of visual separation is an IFR control function (approach/departure/en route). A nonapproach control tower controller by accepting authorization for visual separation becomes responsible for ensuring that separation. Separation requirements also apply to VFR aircraft when IFR, TCA, or ARSA/Stage III separation is prescribed. (See 4-90, 5-90, 7-31, and 7-90 thru 7-104.)

7-11 thru 7-19 RESERVED

Section 3. VFR-ON-TOP

7-20 VFR-ON-TOP

a. You may clear an aircraft to maintain "VFR-on-top" if the pilot of an aircraft on an IFR flight plan requests the clearance.

Phraseology:

MAINTAIN VFR-ON-TOP.

b. You may clear an aircraft to climb through clouds, smoke, haze, or other meteorological formations and then to maintain "VFR-on-top" if the following conditions are met:

(1) The pilot requests the clearance.

(2) You inform the pilot of the reported height of the tops of the meteorological formation, or

(3) You inform the pilot that no top report is available.

(4) When necessary, you ensure separation from all other traffic for which you have separation responsibility by issuing an alternative clearance.

(5) When an aircraft is climbing to and reports reaching "VFR-on-top," reclear the aircraft to maintain "VFR-on-top."

Phraseology:

CLIMB TO AND REPORT REACHING VFR-ON-TOP,

and

TOPS REPORTED (altitude),

or

NO TOPS REPORTS.

IF NOT ON TOP AT (altitude), MAINTAIN (altitude),

and ADVISE.

MAINTAIN VFR-ON-TOP.

c. Do not clear an aircraft to maintain "VFR-on-top," between sunset and sunrise to separate holding aircraft from each other or from en route aircraft unless restrictions are applied to ensure the appropriate IFR vertical separation.

Phraseology:

MAINTAIN VFR-ON-TOP AT OR ABOVE/BELOW/BETWEEN (altitudes).

7-20c Examples. —

"Maintain VFR-on-top at or above one three thousand five hundred."

"Maintain VFR-on-top at or below one two thousand five hundred."

"Maintain VFR-on-top at or between six thousand and one zero thousand."

d. When, in your judgment, there is reason to believe that flight in VFR conditions may become impractical, issue an alternative clearance which will ensure separation from all other aircraft for which you have separation responsibility.

Phraseology:

IF UNABLE, (alternative procedure), AND ADVISE.

7-21 ALTITUDE FOR DIRECTION OF FLIGHT

Inform an aircraft, maintaining "VFR-on-top," when a report indicates the pilot is not complying with FAR 91.109.

7-21 Note. — As required by FAR 91.109, the appropriate VFR altitudes for aircraft (not in a holding pattern of 2 minutes or less, or turning) operating *more than 3,000 feet above the surface to and including FL 290:*

Magnetic courses 0-179 — Odd cardinal altitudes plus 500 feet (e.g., 3,500, 5,500, FL 195, 275).

Magnetic courses 180-359 — Even cardinal altitudes plus 500 feet (e.g., 4,500, 8,500, FL 205, 285).

Above FL 290:

Magnetic courses 0-179 — 4,000 foot intervals beginning with FL 300 (e.g., FL 300, 340, 380).

Magnetic courses 180-359 — 4,000 foot intervals beginning with FL 320 (e.g., 320, 360, 400).

Phraseology:

VFR-ON-TOP CRUISING LEVELS FOR YOUR DIRECTION OF FLIGHT ARE:

More than 3,000 feet above the surface to FL 290:

ODD/EVEN ALTITUDES/FLIGHT LEVELS PLUS FIVE HUNDRED FEET.

Above FL 290:

FOUR THOUSAND FOOT INTERVALS BEGINNING AT FLIGHT LEVEL THREE ZERO ZERO/THREE TWO ZERO.

7-22 thru 7-29 RESERVED

Section 4. APPROACHES

7-30 VISUAL APPROACH

ARTCC's, approach control facilities, and towers may clear aircraft for a visual approach if the following conditions exist:

7-30 Note 1. — Towers may exercise visual approach clearance authority only if authorized by a letter of agreement with the facility providing IFR service or at collocated facilities, a facility directive.

7-30 Note 2. — A visual approach is not an instrument approach procedure and, therefore, has no missed approach segment nor provision for a missed approach. Aircraft unable to complete a visual approach are expected to be handled as any go-around by providing appropriate separation.

a. Potential conflicts with all other aircraft have been resolved.

b. Weather conditions at the airport of intended landing are reported VFR or at airports without weather reporting service, the pilot has been informed that weather is not available and there is reasonable assurance that descent and flight to the airport can be made in VFR conditions.

7-30b Note. — Prior to initiating visual approaches to airports without weather reporting, controllers are expected to consider weather conditions in the area using the sources available, including nearby observations and pilot reports. A pilot-initiated request for a visual approach indicates that descent and flight to the airport can be made in VFR conditions.

c. The pilot has reported sighting the airport.

d. The aircraft is number one in the approach sequence or has reported the preceding aircraft in sight and is instructed to follow it if the aircraft is landing on the same runway. When the preceding traffic is landing on another runway and visual separation is being applied, advise the aircraft of the traffic's intentions and instruct it to maintain visual separation.

7-30d Examples. —

"Cessna Five Six November follow the heavy American Seven Forty-seven cleared for a visual approach to Runway One. Caution, wake turbulence."

"Delta Nine Sixty-four maintain visual separation from the United Seven Twenty-seven landing Runway Two Eight. Cleared for a visual approach to Runway Three Three."

7-30 Reference. — Visual Separation, 7-10.

7-31 VISUAL APPROACHES — RADAR

a. Vectors for a visual approach — You may vector aircraft for a visual approach to the airport of intended landing if the following conditions are met:

7-31a Example 1. — *Controlled Airport:*

"Cessna Four Five Victor turn right heading zero eight zero. Vector for a visual approach to Runway One Seven."

7-31a Example 2. — *Uncontrolled Airport:*

"Aztec Two Four Bravo turn left heading two seven zero. Vector for a visual approach to Martin Airport."

(1) At airports with weather reporting service— The reported ceiling at the airport of intended landing is at least 500 feet above the minimum vectoring altitude and visibility is 3 miles or more, or

(2) At airports without weather reporting service— The pilot has been informed that weather is not available and there is reasonable assurance that descent and flight to the airport can be made in VFR conditions.

7-31a(2) Note. — Prior to initiating vectors for visual approaches to airports without weather reporting, controllers are expected to consider weather conditions in the area using the sources available, including nearby observations and pilot reports. A pilot-initiated request for a visual approach indicates that descent and flight to the airport can be made in VFR conditions.

(3) Separation is provided from any preceding IFR/ARSA/Stage III aircraft until visual separation is provided.

b. Vectors for simultaneous approaches at tower-controlled airports — You may vector aircraft simultaneously for visual approaches while other aircraft are conducting any type approach to the same runway or another runway or airport if the conditions in **a** are met.

c. Continue radar monitoring and traffic information until the aircraft is instructed to contact the tower, the FSS, or upon pilot request, UNICOM or airline company radio when the destination airport is not tower controlled.

7-31c Note 1. — The point at which an aircraft is instructed to contact the tower will vary depending on the runway in use, weather, etc. It is determined by prior coordination between the tower/center controller. Ordinarily, the changeover points are established far enough from the airport so that the tower controller can properly establish a landing sequence, normally prior to entering the airport traffic area.

7-31c Note 2. — When the destination is not a tower-controlled airport, the aircraft may be released to advisory frequency after potential conflicts with known traffic have been resolved.

7-31c Note 3. — Visual approaches and CVFP's are not instrument approach procedures; therefore, they have no missed approach segments. An aircraft unable to complete a visual approach or a CVFP is expected to be handled as any go-around by providing appropriate separation.

Section 5. SPECIAL VFR

7-40 AUTHORIZATION

Special VFR (SVFR) operations in weather conditions less than basic VFR minima are authorized at any location not prohibited by FAR 93.113 or when an exemption to FAR 93.113 has been granted and an associated letter of agreement established only:

a. Within control zones.

b. When requested by the pilot.

c. On the basis of weather conditions reported at the airport of intended landing/departure, or

7-40c Reference. — Climb to VFR, 7-45; Ground Visibility Below One Mile, 7-46.

d. When weather conditions are not reported at the airport of intended landing/departure and the pilot advises he is unable to maintain VFR and requests Special VFR.

Phraseology:

CLEARED TO ENTER/OUT OF/THROUGH CONTROL ZONE, *and, if required,* (direction) OF (airport name) AIRPORT (specified routing), *and* MAINTAIN SPECIAL V-F-R CONDITIONS WHILE IN CONTROL ZONE; *or as applicable for operation under an exemption from FAR 93.113:* CLEARED FOR (coded arrival or departure procedure) ARRIVAL/DEPARTURE, (additional instructions as required).

7-40 Note. — FAR 91.107(e) limits the use of Special VFR by pilots of fixed-wing aircraft to daylight hours except where the pilot is instrument rated and currently qualified, and the aircraft is equipped for IFR flight.

7-41 PRIORITY

a. FW/SVFR flights may be approved only if arriving and departing IFR aircraft are not delayed.

7-41a Example 1. —

A FW/SVFR aircraft has been cleared to enter the control zone and subsequently an IFR aircraft is ready to depart or is in position to begin an approach. Less overall delay might accrue to the IFR aircraft if the FW/SVFR aircraft is allowed to proceed to the airport and land, rather than leave the control zone or be repositioned to provide IFR priority.

7-41a Example 2. —

A FW/SVFR aircraft is number one for takeoff and located in such a position that the number two aircraft, an IFR flight, cannot taxi past to gain access to the runway. Less overall delay might accrue to the IFR aircraft by releasing the FW/SVFR departure rather than by having the aircraft taxi down the runway to a turnoff point so the the IFR aircraft could be released first.

7-41a. Note. — The priority afforded IFR aircraft over FW/SVFR aircraft is not intended to be so rigidly applied that it causes grossly inefficient use of airspace. If better overall efficiency will be gained thereby, the controller has the prerogative of allowing completion of the FW/SVFR operation already in progress when an IFR aircraft becomes a factor.

b. When clearance cannot be granted for a FW/SVFR flight because of IFR traffic, inform the aircraft of the anticipated delay. Do not issue EFC or expected departure time.

Phraseology:

EXPECT (number) MINUTES DELAY, (additional instructions as necessary).

7-42 SEPARATION

Apply approved separation between:

a. Special VFR aircraft.

b. Special VFR aircraft and IFR aircraft.

7-42 Note. — Approved separation is that prescribed for IFR and Special VFR in Chapter 7. Radar vectors are authorized as prescribed in 5-90.

7-43 ALTITUDE ASSIGNMENT

Do not assign a fixed altitude when applying vertical separation, but clear the Special VFR aircraft at or below an altitude which is at least 500 feet below any conflicting IFR traffic but not below the minimum safe altitude prescribed in FAR 91.79.

Phraseology:

MAINTAIN SPECIAL V-F-R CONDITIONS AT OR BELOW (altitude).

7-43 Note 1. — Special VFR aircraft are not assigned fixed altitudes because of the clearance from clouds requirement.

7-43 Note 2. — The minimum safe altitudes are (1) over congested areas, an altitude at least 1,000 feet above the highest obstacle, and (2) over other than congested areas, an altitude at least 500 feet above the surface.

7-44 LOCAL OPERATIONS

Authorize local Special VFR operations for a specified period (series of landings and takeoffs, etc.) upon request if the aircraft can be recalled when traffic or weather conditions require. Where warranted, letters of agreement may be consummated.

Phraseology:

LOCAL SPECIAL V-F-R OPERATIONS IN THE IMMEDIATE VICINITY OF (airport name) AIRPORT ARE AUTHORIZED UNTIL (time). MAINTAIN SPECIAL V-F-R CONDITIONS.

7-44 Reference. — Order 7210.3 — 431, Appropriate Subjects.

7-45 CLIMB TO VFR

Authorize an aircraft to climb to VFR upon request if the only weather limitation is restricted visibility.

Phraseology:

CLIMB TO V-F-R WITHIN THE CONTROL ZONE/WITHIN (a specified distance within control zone) MILES FROM (airport name) AIRPORT, MAINTAIN SPECIAL V-F-R CONDITIONS UNTIL REACHING V-F-R.

7-46 GROUND VISIBILITY BELOW ONE MILE

When the ground visibility is officially reported at an airport as less than 1 mile, treat requests for Special VFR operations at that airport by other than helicopters as follows:

7-46 Note. — FAR 91 does not prohibit helicopter Special VFR flights when visibility is less than 1 mile.

a. Inform departing aircraft that ground visibility is less than 1 mile and that a clearance cannot be issued.

b. Inform arriving aircraft, operating outside of the control zone, that ground visibility is less than 1 mile and that, unless an emergency exists, a clearance cannot be issued.

c. Inform arriving aircraft, operating within the control zone, that ground visibility is less than 1 mile, and ask if the aircraft can depart the control zone with a flight visibility of at least 1 mile. If the reply is "yes," issue a clearance out of control zone. If the reply is "no," or an emergency exists, issue a clearance as soon as traffic conditions permit.

d. Authorize scheduled air carrier aircraft in the United States to conduct operations if ground visibility is not less than ½ statute mile.

7-46d Note. — FAR 121 permits landing or takeoff by domestic scheduled air carriers where a local surface restriction to visibility is not less than ½ statute mile, provided all turns after takeoff or before landing and all flights beyond 1 statute mile from the airport boundary can be accomplished above or outside the area so restricted. The pilot is solely responsible for determining if the nature of the visibility restriction will permit compliance with the provisions of FAR 121.

e. Clear an aircraft to fly through the control zone if he reports flight visibility is at least 1 statute mile.

7-47 FLIGHT VISIBILITY BELOW ONE MILE

When weather conditions are not officially reported at an airport and the pilot advises the flight visibility is less than 1 statute mile, treat requests for Special VFR operations at that airport by other than helicopters as follows:

7-47 Note. — FAR 91 prescribes use of officially reported ground visibility at airports where it is provided, and landing or takeoff "flight visibility" where it is not, as the governing ground visibility for basic and Special VFR operations.

a. Inform departing aircraft that a clearance cannot be issued.

b. Inform arriving aircraft operating outside of the control zone that a clearance cannot be issued unless an emergency exists.

c. Ask an arriving aircraft operating within a control zone if he can depart the control zone with a flight visibility of at least 1 statute mile. If the aircraft cannot depart the control zone accordingly, or an emergency exists, issue a clearance as soon as traffic conditions permit.

7-48 SPECIAL VFR HELICOPTER SEPARATION

a. Control a Special VFR helicopter by Special VFR procedures unless other procedures are contained in a letter of agreement.

TERMINAL

b. Control a Special VFR helicopter by visual separation or Special VFR procedures unless local procedures are contained in a letter of agreement.

7-48 Note. — Control of IFR helicopters is governed by nonradar or radar procedures and minima.

7-49 LOCAL PROCEDURES

TERMINAL

At locations where the volume or complexity of helicopter operations warrants, a letter of agreement shall specify that Special VFR helicopters are required to maintain visual reference to the surface and the traffic patterns, routes and reporting or holding fixes necessary to achieve separation, in accordance with the following minima:

a. Between Special VFR helicopters — *1 mile.* You may, however, use *200 feet* if they are departing simultaneously on diverging courses and you can determine this minimum by reference to the surface markings or you instruct one to remain at least 200 feet from each other.

Section 6. BASIC RADAR SERVICE TO VFR AIRCRAFT — *TERMINAL*

7-60 APPLICATION

In addition to the radar services prescribed elsewhere in Chapter 5, apply the procedures contained in 7-3 when arriving VFR aircraft are handled by approach control and provide vectoring service in accordance with Chapter 5, Section 6.

7-60 Note. — When the Stages of service were developed, two basic radar services (traffic advisories and limited vectoring to VFR aircraft) were identified as STAGE I. This definition became, over the years, unnecessary. Therefore, the term STAGE I has been eliminated from use in the field and the handbooks. These basic services shall still be provided as prescribed in this section.

7-60 Reference. — Airport Traffic Areas, 2-16. Order 7210.3, Chapter 13, Section 1, National Terminal Radar Program. AIM, Terminal Radar Programs for VFR Aircraft.

7-61 thru 7-69 RESERVED

Section 7. STAGE II SERVICE — *TERMINAL*

7-70 APPLICATION

In addition to the basic radar services prescribed in 7-60, apply Stage II procedures at those locations where a program has been established for this purpose. If an aircraft desires the service but cannot communicate on the appropriate frequencies, provide the service to the extent possible using an available frequency. Aircraft which do not desire Stage II service may be fitted into the landing sequence by the tower. Coordination of these aircraft shall be accomplished with the approach control unless a facility directive/letter of agreement prescribes otherwise. Nonparticipating aircraft shall, to the extent possible, be given the same landing sequence they would have received had they been sequenced by radar vectors.

7-70 Note. — The service is mandatory on the controller's part unless the pilot declares that he does not want to participate. Arriving aircraft are assumed to want Stage II service unless the pilot states "Negative Stage II," or makes a similar comment.

7-71 SERVICE AVAILABILITY

Inform aircraft on initial contact whenever this service cannot be provided because of radar outage and apply paragraph 7-3.

7-72 INITIAL CONTACT

An aircraft sighted by the local controller at the time of first radio contact may be positioned in the landing sequence after coordination with approach control.

7-73 IDENTIFICATION

Identify the aircraft before taking action to position it in the approach sequence.

7-74 HOLDING

When holding is required to establish an approach sequence, you may hold VFR aircraft over the initial reporting fix or a fix near the airport. Hold IFR aircraft in accordance with IFR procedures when necessary to fit them into the approach sequence.

7-74 Reference. — Visual holding of VFR aircraft, 7-4.

7-75 APPROACH SEQUENCE

In establishing aircraft in the approach sequence, do not assign landing sequence numbers unless this responsibility has been delegated to you in a letter of agreement or facility directive.

7-75 Note. — The landing sequence is ordinarily established by the local controller.

7-76 SEQUENCING

a. After you establish radar contact, instruct a VFR aircraft to enter the traffic pattern at a specified point or vector it to a position in the approach sequence and inform the pilot of the aircraft he is to follow. If the integrity of the approach sequence depends upon visual contact with a preceding aircraft, ensure that visual contact is established and that instructions to follow the aircraft are issued.

Phraseology:

FOLLOW (description) (position, if necessary).

b. You may direct a VFR aircraft to a point near the airport and instruct it to hold until it is positioned in the approach sequence for the runway in use; or, after coordination with the tower, you may vector it to another runway.

c. IFR sequencing for visual approach — Apply the provisions of 7-31.

7-76c Reference. — Glossary (Visual Approach).

d. Radar sequencing behind a heavy jet — Apply the provisions of 5-72.

7-77 CONTROL TRANSFER

a. Instruct the pilot to contact the tower and inform the local controller of the aircraft's position. If, however, the local controller sights the aircraft before you take the action specified above, instruct the aircraft to change to local control frequency if space is available in the landing sequence, or

7-77a Note. — The point at which an aircraft is instructed to contact the tower is determined by prior coordination between the tower controller and the approach controller and will vary, depending on the runway in use, weather, etc. Ordinarily, the changeover occurs at least 5 miles from the runway. Changeover points should be far enough from the airport so that the tower controller can sequence the aircraft properly, but not at a distance that could derogate the provision of radar traffic information service.

b. Where the approach control ARTS track data is being displayed on the tower's BRITE display, the aircraft is tagged by ARTS, and a facility directive specifies change of communications and control jurisdiction points, instruct the pilot to contact the tower at the appropriate point.

7-78 ABANDONED APPROACH

When an aircraft, under tower control, abandons the approach and coordination with approach control reveals no immediate space in the approach sequence, instruct the aircraft to change to approach control for sequencing.

7-79 VFR DEPARTURE INFORMATION

Inform departing VFR aircraft who request radar traffic advisories when to contact departure control and the frequency to use. After the departure is identified, provide traffic advisories in accordance with 2-21.

7-79 Note. — Departing aircraft desiring traffic information are expected to request the service and to state their proposed direction of flight upon initial contact with ground control

7-80 SERVICE PROVIDED WHEN TOWER IS INOPERATIVE

a. Provide the following services during hours when the tower is not in operation:

(1) Wind direction and velocity.

7-80a(1) Note. — Issue information provided from the FSS or WSO. Otherwise, inform the pilot that wind information is not available.

(2) Traffic information.

(3) Inform aircraft when radar service is terminated.

7-80a(3) Reference. — Radar Service Termination, 5-13.

b. Do not assign landing sequence.

7-81 thru 7-89 RESERVED

Section 8. STAGE III SERVICE — *TERMINAL*

7-90 APPLICATION

In addition to the basic services described in 7-60 and the Stage II services, apply Stage III procedures within the designated Terminal Radar Service Area (TRSA) or Terminal Control Area (TCA).

7-91 ISSUANCE OF EFC

When VFR aircraft are held either inside or outside the TRSA/TCA, inform the pilot when to expect further clearance.

7-92 SEPARATION

Any of the following may be applied within a TRSA/TCA:

7-92 Note 1. — Assignment of radar headings, routes, or altitudes is based on the provision that a pilot operating in accordance with VFR is expected to advise ATC if compliance will cause him to violate any FAR's.

7-92 Note 2. — Stage III separation and sequencing for VFR aircraft is dependent upon radar. When a radar outage occurs, efforts should be made to segregate VFR traffic from the IFR traffic flow.

a. Visual separation, as specified in 7-10, 7-31, and 7-76.

7-92a Note. — The provisions of 7-33a & b are applicable to Stage III operations.

7-92a Reference. — Glossary (Visual Separation).

b. *500 feet* vertical separation between VFR aircraft and between a VFR and an IFR aircraft.

7-92b Note. — 500 feet vertical separation shall not be applied below a heavy jet.

7-92b Reference. — Minima (Radar Separation), 5-72.

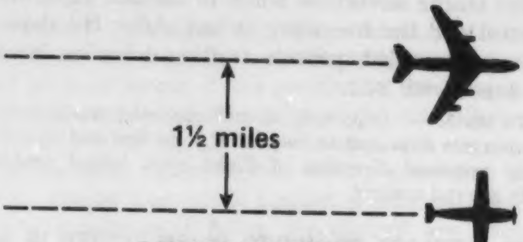
c. Within 15 miles of the radar antenna, separate helicopters and Category I and II VFR aircraft from:

7-92c Note. — This procedure DOES NOT apply between IFR aircraft.

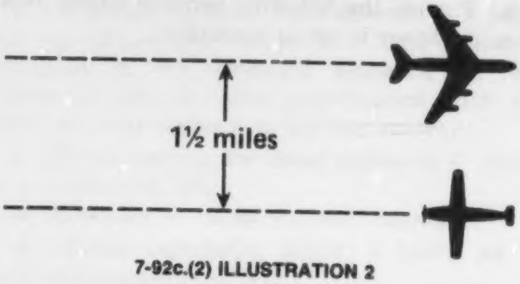
7-92c Reference. — Aircraft Categories, 3-106a. Note.

(1) Other Category I or II VFR/IFR aircraft by a minimum of *1 ½ miles.*

(2) Category III VFR/IFR aircraft by *1 ½ miles* only when both aircraft are on parallel courses.



7-92c.(2) ILLUSTRATION 1



7-92c.(2) ILLUSTRATION 2

d. Within 1 mile of the runway end, ½ mile lateral separation between a helicopter and a fixed-wing aircraft/IFR helicopter on a straight-in approach or a straight-out departure.

7-92d Note. — This procedure applies when either of the two aircraft being separated is within 1 mile of the runway end.

7-92d Reference. — Glossary (Lateral Separation).

7-93 HELICOPTER TRAFFIC

Helicopters need not be separated from other helicopters. Traffic information shall be exchanged, as necessary.

7-94 ALTITUDE ASSIGNMENTS

a. Altitude information contained in a clearance, instruction, or advisory to VFR aircraft shall meet MVA, minimum safe altitude, or minimum IFR altitude criteria.

b. If required, issue altitude assignments, consistent with the provisions of FAR 91.79.

7-94b Note. — The minimum safe altitudes are (1) over congested areas, an altitude at least 1,000 feet above the highest obstacle, and (2) over other than congested areas, an altitude at least 500 feet above the surface.

7-94a Reference. — Flight Direction, 4-40; Exceptions, 4-41; Minimum En route Altitudes, 4-44.

c. When necessary to assign an altitude for separation purposes to VFR aircraft contrary to FAR 91.109, advise the aircraft to resume altitudes

appropriate for the direction of flight when the altitude assignment is no longer needed for separation or when leaving the TCA or TRSA.

Phraseology:

RESUME APPROPRIATE VFR ALTITUDES.

7-95 APPROACH INTERVAL

The tower shall specify the approach interval.

7-96 TRSA DEPARTURE INFORMATION

a. At controlled airports within the TRSA, inform a departing aircraft proposing to operate within the TRSA when to contact departure control and the frequency to use. If the aircraft is properly equipped, ground control or clearance delivery shall issue the appropriate beacon code.

7-96a Note. — Departing aircraft are assumed to want Stage III service unless the pilot states, "Negative Stage III," or makes a similar comment. Pilots are expected to inform the controller of intended destination and/or route of flight and altitude.

b. Provide separation until the aircraft leaves the TRSA.

c. Inform VFR participating aircraft when leaving the TRSA.

Phraseology:

LEAVING THE (name) TRSA *and, as appropriate,* RESUME OWN NAVIGATION, STAND BY FOR TRAFFIC ADVISORIES, RADAR SERVICE TERMINATED, SQUAWK ONE TWO ZERO ZERO, *etc.*

d. Aircraft departing satellite controlled airports that will penetrate the TRSA should be provided the same service as those aircraft departing the primary airport. Procedures for handling this situation shall be covered in a letter of agreement or facility directives, as appropriate.

e. Procedures for handling aircraft departing uncontrolled satellite airports must be advertised in a facility bulletin and service provided accordingly.

7-97 TCA METHODS

a. To the extent practical, clear large turbine-powered aircraft to/from the primary airport using altitudes and routes that avoid VFR corridors and airspace below the TCA floor where VFR aircraft are operating.

7-97a Note. — Pilots operating in accordance with VFR are expected to advise ATC if compliance with assigned altitudes, headings, or routes will cause any violation of FAR's.

b. Workload and traffic conditions permitting, approve/deny requests from VFR aircraft to operate in TCA's.

7-97b Examples. —

"Approved as requested. (Additional instructions, as necessary.)"

"Unable to approve clearance through TCA. (When necessary, reason and/or additional instructions.)"

"Cleared to Los Angeles airport. Enter TCA at three thousand five hundred, vicinity of Queen Mary."

"Cleared to enter TCA via direct Oakland VOR. Maintain four thousand five hundred while in TCA."

"Climb through TCA approved. Report leaving seven thousand."

c. Inform VFR aircraft when leaving the TCA.

Phraseology:

LEAVING THE (name) TCA *and, as appropriate,* RESUME OWN NAVIGATION, STAND BY FOR TRAFFIC ADVISORIES, RADAR SERVICE TERMINATED, SQUAWK ONE TWO ZERO ZERO, *etc.*

d. Vector aircraft to contain them in the TCA once they have entered it. If it is necessary to extend an aircraft's flight path outside the TCA for spacing, inform the aircraft when it leaves and reenters the TCA.

7-97d Note. — FAR 91.90 requires large, turbine-powered aircraft operating to or from the primary airport to operate at or above the designated floor of the TCA while within the lateral limits, unless otherwise authorized by ATC. Such authorization should be the exception rather than the rule.

7-98 thru 7-99 RESERVED

Section 9. AIRPORT RADAR SERVICE AREA (ARSA) SERVICE — *TERMINAL*

7-100 APPLICATION

In addition to the basic radar services described in 7-60 and the STAGE II services described in 7-70, apply ARSA procedures within the designated Airport Radar Service Area and the associated outer area.

7-101 ISSUANCE OF EFC

When VFR aircraft are held either inside or outside the ARSA, inform the pilot when to expect further clearance.

7-102 SEPARATION

a. Except when using a full digital system, any of the following may be applied within an ARSA:

7-102a Note 1. — Assignment of radar headings, routes, or altitudes is based on the provision that a pilot operating in accordance with VFR is expected to advise ATC if compliance will cause him to violate any FAR's.

7-102a Note 2. — Full digital systems are those systems where broadband radar data are not used in the separation of aircraft.

7-102a Note 3. — ARSA separation and sequencing for VFR aircraft is dependent upon radar. When a radar outage occurs, effort should be made to segregate VFR traffic from the IFR traffic flow.

(1) Visual separation, as specified in 7-10, 7-31, and 7-76.

7-102a(1) Note. — The provisions of 7-33b and c are applicable to ARSA operations.

7-102a(1) Reference. — Glossary (Visual Separation).

(2) 500 feet vertical separation between a VFR and an IFR aircraft.

7-102a(2) Note. — 500 feet vertical separation shall not be applied below a heavy jet.

7-102a(2) Reference. — Minima (Radar Separation), 5-72.

b. Provide ARSA service as follows:

(1) Sequence to the Primary/ARSA Airport.

(2) IFR/IFR— Standard IFR Separation.

(3) IFR/VFR— Traffic Advisories and Conflict Resolution.

7-102b(3) Reference. — Glossary (Conflict Resolution).

(4) VFR/VFR— Traffic Advisories and, as appropriate, Safety Advisories.

7-103 HELICOPTER TRAFFIC

IFR/VFR helicopters need not be separated from other VFR helicopters. Traffic information shall be exchanged, as necessary.

7-104 ALTITUDE ASSIGNMENTS

a. Altitude information contained in a clearance, instruction, or advisory to VFR aircraft shall meet the MVA, the minimum safe altitude, or the minimum IFR altitude criteria.

b. If required, issue altitude assignments consistent with the provisions of FAR 91.79.

7-104b Note. — The minimum safe altitudes are (1) over congested areas, an altitude at least 1,000 feet above the highest obstacle, and (2) over other than congested areas, an altitude at least 500 feet above the surface.

7-104b Reference. — Flight Direction, 4-40; Exceptions, 4-41; Minimum Enroute Altitudes, 4-44.

c. When necessary to assign an altitude for separation purposes to VFR aircraft contrary to FAR 91.109, advise the aircraft to resume altitudes appropriate for the direction of flight when the altitude assignment is no longer needed for separation or when leaving the ARSA/associated outer area.

Phraseology:

RESUME APPROPRIATE VFR ALTITUDES.

7-105 APPROACH INTERVAL

The tower shall specify the approach interval.

7-106 ARSA DEPARTURE INFORMATION

a. At controlled airports within the ARSA, inform a departing aircraft when to contact departure control and the frequency to use. If the aircraft is properly equipped, ground control or clearance delivery shall issue the appropriate beacon code.

7-106a Note. — Pilots are expected to inform the controller of intended destination and/or direction of flight and altitude.

b. Provide separation/service until the aircraft leaves the ARSA/associated outer area.

7-106b Note. — Provide basic radar service beyond the outer area on a workload permitting basis.

c. Aircraft departing satellite controlled airports that will penetrate the ARSA shall be provided the same service as those aircraft departing the primary airport. Procedures for handling this situation shall be covered in a letter of agreement or a facility directive, as appropriate.

d. Procedures for handling aircraft departing uncontrolled satellite airports must be advertised in a facility bulletin and service provided accordingly.

APPENDIX A

PILOT/CONTROLLER GLOSSARY

JUNE 6, 1985

This Glossary was compiled to promote a common understanding of the terms used in the Air Traffic Control system. It includes those terms which are intended for pilot/controller communications. Those terms most frequently used in pilot/controller communications are printed in ***bold italics***. The definitions are primarily defined in an operational sense applicable to both users and operators of the National Airspace System. Use of the Glossary will preclude any misunderstandings concerning the system's design, function, and purpose.

Because of the international nature of flying, terms used in the "Lexicon," published by the International Civil Aviation Organization (ICAO), are included when they differ from FAA definitions. These terms are *italicized*. For the reader's convenience, there are also cross references to related terms in other parts of the Glossary and to other documents, such as the Federal Aviation Regulations (FARs) and the Airman's Information Manual (AIM).

This Glossary will be revised as necessary to maintain a common understanding of the system.

ABBREVIATED IFR FLIGHT PLANS— An authorization by ATC requiring pilots to submit only that information needed for the purpose of ATC. It includes only a small portion of the usual IFR flight plan information. In certain instances, this may be only aircraft identification, location, and pilot request. Other information may be requested if needed by ATC for separation/control purposes. It is frequently used by aircraft which are airborne, desire an instrument approach, or by aircraft on the ground which desire a climb to VFR on top. (See VFR-ON-TOP) (Refer to AIM)

ABEAM— An aircraft is "abeam" a fix, point or object when that fix, point or object is approximately 90 degrees to the right or left of the aircraft track. Abeam indicates a general position rather than a precise point.

ABORT— To terminate a preplanned aircraft maneuver; e.g., an aborted takeoff.

ACKNOWLEDGE— Let me know that you have received my message.

ICAO—ACKNOWLEDGE— Let me know that you have received and understood this message.

ACROBATIC FLIGHT— An intentional maneuver involving an abrupt change in an aircraft's attitude, an abnormal attitude, or abnormal acceleration, not necessary for normal flight. (Refer to FAR Part 91)

*ICAO—ACROBATIC FLIGHT—*Maneuvers intentionally performed by an aircraft involving an abrupt change in its attitude, an abnormal attitude, or an abnormal variation in speed.

ADDITIONAL SERVICES— Advisory information provided by ATC which includes but is not limited to the following:

1. Traffic advisories.
2. Vectors, when requested by the pilot, to assist aircraft receiving traffic advisories to avoid observed traffic.
3. Altitude deviation information of 300 feet or more from an assigned altitude as observed on a verified (reading correctly) automatic altitude readout (Mode C).
4. Advisories that traffic is no longer a factor.
5. Weather and chaff information.
6. Weather assistance.
7. Bird activity information.
8. Holding pattern surveillance.

Additional services are provided to the extent possible contingent only upon the controller's capability to fit them into the performance of higher priority duties and on the basis of limitations of the radar, volume of traffic, frequency congestion and controller workload. The controller has complete discretion for determining if he is able to provide or continue to provide a service in a particular case. The controller's reason not to provide or continue to provide a service in a particular case is not subject to question by the pilot and need not be made known to him. (See Traffic Advisories) (Refer to AIM)

ADMINISTRATOR— The Federal Aviation Administrator or any person to whom he has delegated his authority in the matter concerned.

ADVISE INTENTIONS— Tell me what you plan to do.

ADVISORY— Advice and information provided to assist pilots in the safe conduct of flight and aircraft movement. (See Advisory Service)

ADVISORY FREQUENCY— The appropriate frequency to be used for Airport Advisory Service. (See Airport Advisory Service and UNICOM) (Refer to Advisory Circular No. 90-42 and AIM)

ADVISORY SERVICE— Advice and information provided by a facility to assist pilots in the safe conduct of flight and aircraft movement. (See Airport Advisory Service, Traffic Advisories, Safety Advisories, Additional Services, Radar Advisory, En Route Flight Advisory Service) (Refer to AIM)

AERIAL REFUELING/IN-FLIGHT REFUELING— A procedure used by the military to transfer fuel from one aircraft to another during flight. (Refer to VFR/IFR Wall Planning Charts).

AERODROME— A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and movement of aircraft.

AERONAUTICAL BEACON— A visual NAVAID displaying flashes of white and/or colored light to indicate the location of an airport, a heliport, a landmark, a certain point of a Federal airway in mountainous terrain, or an obstruction. (See Airport Rotating Beacon) (Refer to AIM)

AERONAUTICAL CHART— A map used in air navigation containing all or part of the following: Topographic features, hazards and obstructions, navigation aids, navigation routes, designated airspace, and airports. Commonly used aeronautical charts are:

1. Sectional Charts—1:500,000—Designed for visual navigation of slow or medium speed aircraft. Topographic information on these charts features the portrayal of relief, and a judicious selection of visual check points for VFR flight. Aeronautical information includes visual and radio aids to navigation, airports, controlled airspace, restricted areas, obstructions and related data.
2. VFR Terminal Area Charts—1:250,000—Depict Terminal Control Area (TCA) airspace which provides for the control or segregation of all the aircraft within the TCA. The chart depicts topographic information and aeronautical information which includes visual and radio aids to navigation, airports, controlled airspace, restricted areas, obstructions, and related data.
3. World Aeronautical Charts (WAC)—1:1,000,000—Provide a standard series of aeronautical charts covering land areas of the world at a size and scale convenient for navigation by moderate speed aircraft. Topographic information includes cities and towns, principal roads, railroads, distinctive landmarks, drainage, and relief. Aeronautical information includes visual and radio aids to navigation, airports, airways, restricted areas, obstructions and other pertinent data.
4. En Route Low Altitude Charts—Provide aeronautical information for en route instrument navigation (IFR) in the low altitude stratum. Information includes the portrayal of airways, limits of controlled airspace, position identification and frequencies of radio aids, selected airports, minimum en route and minimum obstruction clearance altitudes, airway distances, reporting points, restricted areas, and related data. Area charts which are a part of this series furnish terminal data at a larger scale in congested areas.
5. En Route High Altitude Charts—Provide aeronautical information for en route instrument navigation (IFR) in the high altitude stratum. Information includes the portrayal of jet routes, identification and frequencies of radio aids, selected airports, distances, time zones, special use airspace, and related information.
6. Instrument Approach Procedures (IAP) Charts—Portray the aeronautical data which is required to execute an instrument approach to an airport. These charts depict the procedures, including all related data, and the airport diagram. Each procedure is designated for use with a specific type of electronic navigation system including NDB, TACAN, VOR, ILS, and RNAV. These charts are identified by the type of navigational aid(s) which provide final approach guidance.
7. Standard Instrument Departure (SID) Charts—Designed to expedite clearance delivery and to facilitate transition between takeoff and en route operations. Each SID procedure is presented as a separate chart and may serve a single airport or more than one airport in a given geographical location.
8. Standard Terminal Arrival (STAR) Charts— Designed to expedite air traffic control arrival route procedures and to facilitate transition between en route and instrument approach operations. Each STAR procedure is presented as a separate chart and may serve a single airport or more than one airport in a given geographical location.
9. Airport Taxi Charts—Designed to expedite the efficient and safe flow of ground traffic at an airport. These charts are identified by the official airport name; e.g., Washington National Airport.

ICAO—AERONAUTICAL CHART—A representation of a portion of the earth, its culture and relief, specifically designated to meet the requirements of air navigation.

AFFIRMATIVE— Yes.

AIR CARRIER DISTRICT OFFICE/ACDO— An FAA field office serving an assigned geographical area, staffed with Flight Standards personnel serving the aviation industry and the general public on matters related to the certification and operation of scheduled air carriers and other large aircraft operations.

AIRCRAFT— Device/s that are used or intended to be used for flight in the air, and when used in air traffic control terminology, may include the flight crew.

ICAO-AIRCRAFT—Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

AIRCRAFT APPROACH CATEGORY— A grouping of aircraft based on a speed of 1.3 times the stall speed in the landing configuration at maximum gross landing weight. An aircraft shall fit in only one category. If it is necessary to maneuver at speeds in excess of the upper limit of a speed range for a category, the minimums for the next higher category should be used. For example, an aircraft which falls in Category A, but is circling to land at a speed in excess of 91 knots, should use the approach Category B minimums when circling to land. The categories are as follows:

1. Category A—Speed less than 91 knots.
2. Category B—Speed 91 knots or more but less than 121 knots.
3. Category C—Speed 121 knots or more but less than 141 knots.
4. Category D—Speed 141 knots or more but less than 166 knots.
5. Category E—Speed 166 knots or more.

(Refer to FAR Parts 1 and 97)

AIRCRAFT CLASSES— For the purposes of Wake Turbulence Separation Minima, ATC classifies aircraft as Heavy, Large, and Small as follows:

1. Heavy—Aircraft capable of takeoff weights of 300,000 pounds or more whether or not they are operating at this weight during a particular phase of flight.
2. Large—Aircraft of more than 12,500 pounds, maximum certificated takeoff weight, up to 300,000 pounds.
3. Small—Aircraft of 12,500 pounds or less maximum certificated takeoff weight. (Refer to AIM)

AIR DEFENSE EMERGENCY— A military emergency condition declared by a designated authority. This condition exists when an attack upon the continental U.S., Alaska, Canada, or U.S. installations in Greenland by hostile aircraft or missiles is considered probable, is imminent, or is taking place. (Refer to AIM)

AIR DEFENSE IDENTIFICATION ZONE/ADIZ— The area of airspace over land or water, extending upward from the surface, within which the ready identification, the location, and the control of aircraft are required in the interest of national security.

1. Domestic Air Defense Identification Zone— An ADIZ within the United States along an international boundary of the United States.
2. Coastal Air Defense Identification Zone— An ADIZ over the coastal waters of the United States.
3. Distant Early Warning Identification Zone (DEWIZ)— An ADIZ over the coastal waters of the State of Alaska.

ADIZ locations and operating and flight plan requirements for civil aircraft operations are specified in FAR Part 99. (Refer to AIM)

AIRMAN'S INFORMATION MANUAL/AIM— A publication containing Basic Flight Information and ATC Procedures designed primarily as a pilot's instructional manual for use in the National Airspace System of the United States.

ICAO-AERONAUTICAL INFORMATION PUBLICATION—A publication issued by or with the authority of a state and containing aeronautical information of a lasting character essential to air navigation.

AIRMET **/WA/AIRMAN'S METEOROLOGICAL INFORMATION—** In-flight weather advisories issued only to amend the area forecast concerning weather phenomena which are of operational interest to all aircraft and potentially hazardous to aircraft having limited capability because of lack of equipment, instrumentation, or pilot qualifications. AIRMET's concern weather of less severity than that covered by SIGMET's or Convective SIGMET's. AIRMET's cover moderate icing, moderate turbulence, sustained winds of 30 knots or more at the surface, widespread areas of ceilings less than 1,000 feet and/or visibility less than 3 miles, and extensive mountain obscurement. (See SIGMET and Convective SIGMET) (Refer to AIM)

AIR NAVIGATION FACILITY— Any facility used in, available for use in, or designed for use in, aid of air navigation, including landing areas, lights, any apparatus or equipment for disseminating weather information, for signaling, for radio-directional finding, or for radio or other electrical communication, and any other structure or mechanism having a similar purpose for guiding or controlling flight in the air or the landing and take-off of aircraft. (See Navigational Aid)

AIRPORT— An area on land or water that is used or intended to be used for the landing and takeoff of aircraft and includes its buildings and facilities, if any.

AIRPORT ADVISORY AREA— The area within ten miles of an airport without a control tower or where the tower is not in operation, and on which a Flight Service Station is located. (See Airport Advisory Service) (Refer to AIM)

AIRPORT ADVISORY SERVICE/AAS— A service provided by flight service stations located at airports not serviced by a control tower. This service consists of providing information to arriving and departing aircraft concerning wind direction and speed, favored runway, altimeter setting, pertinent known traffic, pertinent known field conditions, airport taxi routes and traffic patterns, and authorized instrument approach procedures. This information is advisory in nature and does not constitute an ATC clearance. (See Airport Advisory Area)

AIRPORT ELEVATION/FIELD ELEVATION— The highest point of an airport's usable runways measured in feet from mean sea level. (See Touchdown Zone Elevation)

ICAO-AERODROME ELEVATION—The elevation of the highest point of the landing area.

AIRPORT/FACILITY DIRECTORY— A publication designed primarily as a pilot's operational manual containing all airports, seaplane bases, and heliports open to the public including communications data, navigational facilities, and certain special notices and procedures. This publication is issued in seven volumes according to geographical area.

AIRPORT INFORMATION DESK/AID— An airport unmanned facility designed for pilot self-service briefing, flight planning, and filing of flight plans. (Refer to AIM)

AIRPORT LIGHTING— Various lighting aids that may be installed on an airport. Types of airport lighting include:

1. Approach Light System/ALS—An airport lighting facility which provides visual guidance to landing aircraft by radiating light beams in a directional pattern by which the pilot aligns the aircraft with the extended centerline of the runway on his final approach for landing.

   Condenser-Discharge Sequential Flashing Lights/Sequenced Flashing Lights may be installed in conjunction with the ALS at some airports. Types of Approach Light Systems are:

   a. ALSF-I—Approach Light System with Sequenced Flashing Lights in ILS Cat-I configuration.
   b. ALSF-II—Approach Light System with Sequenced Flashing Lights in ILS Cat-II configuration.
   c. SSALF—Simplified Short Approach Light System with Sequenced Flashing Lights.
   d. SSALR—Simplified Short Approach Light System with Runway Alignment Indicator Lights.
   e. MALSF—Medium Intensity Approach Light System with Sequenced Flashing Lights.
   f. MALSR—Medium Intensity Approach Light System with Runway Alignment Indicator Lights.
   g. LDIN—Sequenced Flashing Lead-in Lights.
   h. RAIL—Runway Alignment Indicator Lights (Sequenced Flashing Lights which are installed only in combination with other light systems).
   i. ODALS—Omnidirectional Approach Lighting System consists of seven omnidirectional flashing lights located in the approach area of a nonprecision runway. Five lights are located on the runway centerline extended with the first light located 300 feet from the threshold and extending at equal intervals up to 1,500 feet from the threshold. The other two lights are located, one on each side of the runway threshold, at a lateral distance of 40 feet from the runway edge, or 75 feet from the runway edge when installed on a runway equipped with a VASI. (Refer to Order 6850.2A)

2. Runway Lights/Runway Edge Lights—Lights having a prescribed angle of emission used to define the lateral limits of a runway. Runway lights are uniformly spaced at intervals of approximately 200 feet, and the intensity may be controlled or preset.

3. Touchdown Zone Lighting—Two rows of tranverse light bars located symmetrically about the runway centerline normally at 100 foot intervals. The basic system extends 3,000 feet along the runway.

4. Runway Centerline Lighting—Flush centerline lights spaced at 50-foot intervals beginning 75 feet from the landing threshold and extending to within 75 feet of the opposite end of the runway.

5. Threshold Lights—Fixed green lights arranged symmetrically left and right of the runway centerline, identifying the runway threshold.

6. Runway End Identifier Lights/REIL—Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.

7. Visual Approach Slope Indicator/VASI— An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that he is "on path" if he sees red/white, "above path' if white/white, and "below path" if red/red. Some airports serving large aircraft have three-bar VASIs which provide two visual glide paths to the same runway.

8. Boundary Lights—Lights defining the perimeter of an airport or landing area. (Refer to AIM)

AIRPORT MARKING AIDS— Markings used on runway and taxiway surfaces to identify a specific runway, a runway threshold, a centerline, a hold line, etc. A runway should be marked in accordance with its present usage such as:

1. Visual.
2. Nonprecision instrument.
3. Precision instrument. (Refer to AIM)

AIRPORT RADAR SERVICE AREA/ARSA—(See Controlled Airspace)

AIRPORT ROTATING BEACON—A visual NAVAID operated at many airports. At civil airports, alternating white and green flashes indicate the location of the airport. At military airports, the beacons flash alternately white and green, but are differentiated from civil beacons by dualpeaked (two quick) white flashes between the green flashes. (See Special VFR Operations, Instrument Flight Rules) (Refer to AIM, Rotating Beacons)

ICAO-AERODROME BEACON—Aeronautical beacon used to indicate the location of an aerodrome.

AIRPORT SURFACE DETECTION EQUIPMENT/ ASDE— Radar equipment specifically designed to detect all principal features on the surface of an airport including aircraft and vehicular traffic and to present the entire image on a radar indicator console in the control tower. Used to augment visual observation by tower personnel of aircraft and/or vehicular movements on runways and taxiways.

AIRPORT SURVEILLANCE RADAR/ASR— Approach control radar used to detect and display an aircraft's position in the terminal area. ASR provides range and azimuth information but does not provide elevation data. Coverage of the ASR can extend up to 60 miles.

AIRPORT TRAFFIC AREA— Unless otherwise specifically designated in FAR Part 93, that airspace within a horizontal radius of 5 statute miles from the geographical center of any airport at which a control tower is operating, extending from the surface up to, but not including, an altitude of 3,000 feet above the elevation of an airport. Unless otherwise authorized or required by ATC, no person may operate an aircraft within an airport traffic area except for the purpose of landing at, or taking off from, an airport within that area. ATC authorizations may be given as individual approval of specific operations or may be contained in written agreements between airport users and the tower concerned. (Refer to FAR Parts 1 and 91).

AIRPORT TRAFFIC CONTROL SERVICE— A service provided by a control tower for aircraft operating on the movement area and in the vicinity of an airport. (See Movement Area, Tower)

ICAO-AERODROME CONTROL SERVICE—Air traffic control service for aerodrome traffic.

AIR ROUTE SURVEILLANCE RADAR/ARSR— Air route traffic control center (ARTCC) radar used primarily to detect and display an aircraft's position while en route between terminal areas. The ARSR enables controllers to provide radar air traffic control service when aircraft are within the ARSR coverage. In some instances, ARSR may enable an ARTCC to provide terminal radar services similar to but usually more limited than those provided by a radar approach control.

AIR ROUTE TRAFFIC CONTROL CENTER/ ARTCC— A facility established to provide air traffic control service to aircraft operating on IFR flight plans within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft. (See NAS Stage A, En Route Air Traffic Control Service) (Refer to AIM)

AIRSPEED— The speed of an aircraft relative to its surrounding air mass. The unqualified term "airspeed' means one of the following:

1. Indicated Airspeed—The speed shown on the aircraft airspeed indicator. This is the speed used in pilot/controller communications under the general term "airspeed." (Refer to FAR Part 1)
2. True Airspeed—The airspeed of an aircraft relative to undisturbed air. Used primarily in flight planning and en route portion of flight. When used in pilot/controller communications, it is referred to as "true airspeed" and not shortened to "airspeed."

AIRSTART— The starting of an aircraft engine while the aircraft is airborne, preceded by engine shutdown during training flights or by actual engine failure.

AIR TAXI— Used to describe a helicopter/VTOL aircraft movement conducted above the surface but normally not above 100 feet AGL. The aircraft may proceed either via hover taxi or flight at speeds more than 20 knots. The pilot is solely responsible for selecting a safe airspeed/altitude for the operation being conducted. (See Hover Taxi) (Refer to AIM)

AIR TRAFFIC— Aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.

ICAO—AIR TRAFFIC—All aircraft in flight or operating on the maneuvering area of an aerodrome.

AIR TRAFFIC CLEARANCE/ATC CLEARANCE— An authorization by air traffic control, for the purpose of preventing collision between known aircraft, for an aircraft to proceed under specified traffic conditions within controlled airspace. (See ATC Instructions)

ICAO—AIR TRAFFIC CONTROL CLEARANCE—Authorization for an aircraft to proceed under conditions specified by an air traffic control unit.

AIR TRAFFIC CONTROL/ATC— A service operated by appropriate authority to promote the safe, orderly and expeditious flow of air traffic.

ICAO—AIR TRAFFIC CONTROL SERVICE—A service provided for the purpose of:

1. Preventing collisions:
    a. Between aircraft, and
    b. On the maneuvering area between aircraft and obstructions, and
2. Expediting and maintaining an orderly flow of air traffic.

AIR TRAFFIC CONTROL SERVICE— (See Air Traffic Control)

AIR TRAFFIC CONTROL SPECIALIST/CONTROLLER— A person authorized to provide air traffic control service. (See Air Traffic Control, Flight Service Station)

ICAO—CONTROLLER—A person authorized to provide air traffic control services.

AIR TRAFFIC CONTROL COMMAND CENTER/ ATCCC— An air traffic service facility consisting of four operational units.

1. Central Flow Control Function/CFCF—Responsible for coordination and approval of all major intercenter flow control restrictions on a system basis in order to obtain maximum utilization of the airspace. (See Fuel Advisory Departure, Quota Flow Control)

2. Central Altitude Reservation Function/CARF— Responsible for coordinating, planning and approving special user requirements under the Altitude Reservation (ALTRV) concept. (See Altitude Reservation)

3. Airport Reservation Office/ARO—Responsible for approving IFR flights at designated high density traffic airports (John F. Kennedy, LaGuardia, O'Hare and Washington National) during specified hours. (Refer to FAR Part 93 and Airport/Facility Directory)

4. ATC Contingency Command Post—A facility which enables the FAA to manage the ATC system when significant portions of the system's capabilities have been lost or are threatened.

AIRWAY BEACON— Used to mark airway segments in remote mountain areas. The light flashes Morse Code to identify the beacon site. (Refer to AIM)

AIRWAY/FEDERAL AIRWAY— A control area or portion thereof established in the form of a corridor, the centerline of which is defined by radio navigational aids. (Refer to FAR Part 71, AIM)

ICAO-AIRWAY—A control area or portion thereof established in the form of corridor equipped with radio navigational aids.

ALERT AREA— (See Special Use Airspace)

ALERT NOTICE/ALNOT— A message sent by a Flight Service Station (FSS) or Air Route Traffic Control Center (ARTCC) that requests an extensive communication search for overdue, unreported, or missing aircraft.

ALPHANUMERIC DISPLAY/DATA BLOCK— Letters and numerals used to show identification, altitude, beacon code, and other information concerning a target on a radar display. (See Automated Radar Terminal Systems, NAS Stage A)

ALTERNATE AIRPORT— An airport at which an aircraft may land if a landing at the intended airport becomes inadvisable.

ICAO-ALTERNATE AERODROME—An aerodrome specified in the flight plan to which a flight may proceed when it becomes inadvisable to land at the aerodrome of intended landing.

ALTIMETER SETTING— The barometric pressure reading used to adjust a pressure altimeter for variations in existing atmospheric pressure or to the standard altimeter setting (29.92). (Refer to FAR Part 91, AIM)

ALTITUDE— The height of a level, point, or object measured in feet Above Ground Level (AGL) or from Mean Sea Level (MSL). (See Flight Level)

1. MSL Altitude—Altitude expressed in feet measured from mean sea level.

2. AGL Altitude—Altitude expressed in feet measured above ground level.

3. Indicated Altitude—The altitude as shown by an altimeter. On a pressure or barometric altimeter it is altitude as shown uncorrected for instrument error and uncompensated for variation from standard atmospheric conditions.

ICAO-ALTITUDE—The vertical distance of a level, a point or an object considered as a point, measured from mean sea level.

ALTITUDE READOUT/AUTOMATIC ALTITUDE REPORT— An aircraft's altitude, transmitted via the Mode C transponder feature, that is visually displayed in 100-foot increments on a radar scope having readout capability. (See Automated Radar Terminal Systems, NAS Stage A, Alphanumeric Display) (Refer to AIM)

ALTITUDE RESERVATION/ALTRV— Airspace utilization under prescribed conditions normally employed for the mass movement of aircraft or other special user requirements which cannot otherwise be accomplished. ALTRVs are approved by the appropriate FAA facility. (See Air Traffic Control Command Center)

ALTITUDE RESTRICTION— An altitude or altitudes stated in the order flown, which are to be maintained until reaching a specific point or time. Altitude restrictions may be issued by ATC due to traffic, terrain or other airspace considerations.

ALTITUDE RESTRICTIONS ARE CANCELLED— Adherence to previously imposed altitude restrictions is no longer required during a climb or descent.

APPROACH CLEARANCE— Authorization by ATC for a pilot to conduct an instrument approach. The type of instrument approach for which clearance and other pertinent information is provided in the approach clearance when required. (See Instrument Approach Procedure, Cleared for Approach) (Refer to AIM and FAR Part 91)

APPROACH CONTROL FACILITY— A terminal ATC facility that provides approach control service in a terminal area. (See Approach Control Service, Radar Approach Control Facility.

APPROACH CONTROL SERVICE— Air traffic control service provided by an approach control facility for arriving and departing VFR/IFR aircraft and, on occasion, en route aircraft. At some airports not served by an approach control facility, the ARTCC provides limited approach control service. (Refer to AIM)

ICAO—APPROACH CONTROL SERVICE—Air traffic service for arriving or departing controlled flights.

APPROACH GATE— The point on the final approach course which is 1 mile from the final approach fix on the side away from the airport or 5 miles from landing threshold, whichever is farther from the landing threshold. This is an imaginary point used within ATC as a basis for final approach course interception for aircraft being vectored to the final approach course.

APPROACH LIGHT SYSTEM— (See Airport Lighting)

APPROACH SEQUENCE— The order in which aircraft are positioned while on approach or awaiting approach clearance. (See Landing Sequence)

*ICAO—APPROACH SEQUENCE—*The order in which two or more aircraft are cleared to approach to land at the aerodrome.

APPROACH SPEED— The recommended speed contained in aircraft manuals used by pilots when making an approach to landing. This speed will vary for different segments of an approach as well as for aircraft weight and configuration.

APRON/RAMP— A defined area on an airport or heliport intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking, or maintenance. With regard to seaplanes, a ramp is used for access to the apron from the water.

*ICAO—APRON—*A defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking or maintenance.

ARC— The track over the ground of an aircraft flying at a constant distance from a navigational aid by reference to distance measuring equipment (DME).

AREA NAVIGATION/RNAV— A method of navigation that permits aircraft operations on any desired course within the coverage of station-referenced navigation signals or within the limits of self-contained system capability. (Refer to AIM, FAR Part 71)

1. Area Navigation Low Route—An area navigation route within the airspace extending upward from 1,200 feet above the surface of the earth to, but not including 18,000 feet MSL.
2. Area Navigation High Route—An area navigation route within the airspace extending upward from and including 18,000 feet MSL to flight level 450.
3. Random Area Navigation Routes/Random RNAV Routes—Direct routes, based on area navigation capability, between waypoints defined in terms of latitude/longitude coordinates, degree/distance fixes, or offset from published or established routes/airways at a specified distance and direction.
4. RNAV Waypoint/W/P—A predetermined geographical position used for route or instrument approach definition or progress reporting purposes that is defined relative to a VORTAC station position/or in terms of latitude/longitude coordinates.

*ICAO—AREA NAVIGATION/RNAV—*A method of navigation which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids or a combination of these.

ARMY AVIATION FLIGHT INFORMATION BULLETIN/USAFIB—A bulletin that provides air operation data covering Army, National Guard, and Army Reserve aviation activities.

ARRESTING SYSTEM—A safety device consisting of two major components, namely, engaging or catching devices, and energy absorption devices for the purpose of arresting both tail hook and/or non-tail hook equipped aircraft. It is used to prevent aircraft from overrunning runways when the aircraft cannot be stopped after landing or during aborted takeoff. Arresting systems have various names; e.g., arresting gear, hook, device, wire barrier cable. (See Abort) (Refer to AIM)

ARRIVAL TIME—The time an aircraft touches down on arrival.

ARTCC—(See Air Route Traffic Control Center)

ASR APPROACH— (See Surveillance Approach)

ATC ADVISES— Used to prefix a message of noncontrol information when it is relayed to an aircraft by other than an air traffic controller. (See Advisory)

ATC ASSIGNED AIRSPACE/ATCAA— Airspace of defined vertical/lateral limits, assigned by ATC, for the purpose of providing air traffic segregation between the specified activities being conducted within the assigned airspace and other IFR air traffic. (See Military Operations Area, Alert Area)

ATC CLEARANCE— (See Air Traffic Clearance)

ATC CLEARS— Used to prefix an ATC clearance when it is relayed to an aircraft by other than an air traffic controller.

ATC INSTRUCTIONS— Directives issued by air traffic control for the purpose of requiring a pilot to take specific actions; e.g., "Turn left heading two five zero," "Go around," "Clear the runway." (Refer to FAR Part 91)

ATCRBS— (See Radar)

ATC REQUESTS— Used to prefix an ATC request when it is relayed to an aircraft by other than an air traffic controller.

AUTOMATED RADAR TERMINAL SYSTEMS/ARTS— The generic term for the ultimate in functional capability afforded by several automation systems. Each differs in functional capabilities and equipment. ARTS plus a suffix roman numeral denotes a specific system. A following letter indicates a major modification to that system. In general, an ARTS displays for the terminal controller aircraft identification, flight plan data, other flight associated information, e.g., altitude and speed, and aircraft position symbols in conjunction with his radar presentation. Normal radar co-exists with the alphanumeric display. In addition to enhancing visualization of the air traffic situation, ARTS facilitate intra/inter-facility transfer and coordination of flight information. These capabilities are enabled by specially designed computers and subsystems tailored to the radar and communications equipments and operational requirements of each automated facility. Modular design permits adoption of improvements in computer software and electronic technologies as they become available while retaining the characteristics unique to each system.

1. ARTS II—A programmable non-tracking, computer aided display subsystem capable of modular expansion. ARTS II systems provide a level of automated air traffic control capability at terminals having low to medium activity. Flight identification and altitude may be associated with the display of secondary radar targets. Also, flight plan information may be exchanged between the terminal and ARTCC.
2. ARTS III—The Beacon Tracking Level (BTL) of the modular programmable automated radar terminal system in use at medium to high activity terminals. ARTS III detects, tracks and predicts secondary radar derived aircraft targets. These are displayed by means of computer-generated symbols and alphanumeric characters depicting flight identification, aircraft altitude, ground speed and flight plan data. Although it does not track primary targets, they are displayed coincident with the secondary radar as well as the symbols and alphanumerics. The system has the capability of communicating with ARTCCs and other ARTS III facilities.
3. ARTS IIIA—The Radar Tracking and Beacon Tracking Level (RT&BTL) of the modular, programmable automated radar terminal system. ARTS IIIA detects, tracks and predicts primary as well as secondary radar-derived aircraft targets. This more sophisticated computer-driven system upgrades the existing ARTS III system by providing improved tracking, continuous data recording and fail-soft capabilities.

AUTOMATIC ALTITUDE REPORTING— That function of a transponder which responds to Mode C interrogations by transmitting the aircraft's altitude in 100-foot increments.

AUTOMATIC CARRIER LANDING SYSTEM/ACLS— U.S. Navy final approach equipment consisting of precision tracking radar coupled to a computer data link to provide continuous information to the aircraft, monitoring capability to the pilot and a backup approach system.

AUTOMATIC DIRECTION FINDER/ADF— An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum. (See Bearing, Nondirectional Beacon)

AUTOMATIC TERMINAL INFORMATION SERVICE/ATIS— The continuous broadcast of recorded noncontrol information in selected terminal areas. Its purpose is to improve controller effectiveness and to relieve frequency congestion by automating the repetitive transmission of essential but routine information, e.g.,"Los Angeles information Alfa. One three zero zero Greenwich. Weather, measured ceiling two thousand overcast, visibility three, haze, smoke, temperature seven one, dew point five seven, wind two five zero at five, altimeter two niner niner six. I-L-S Runway Two Five Left approach in use, Runway Two Five Right closed, advise you have Alfa." (Refer to AIM)

*ICAO—AUTOMATIC TERMINAL INFORMATION SERVICE—*The provision of current, routine information to arriving and departing aircraft by means of continuous and repetitive broadcasts throughout the day or a specified portion of the day.

AUTOROTATION— A rotorcraft flight condition in which the lifting rotor is driven entirely by action of the air when the rotorcraft is in motion.

1. Autorotative Landing/Touchdown Autorotation—Used by a pilot to indicate that he will be landing without applying power to the rotor.
2. Low Level Autorotation—Commences at an altitude well below the traffic pattern, usually below 100 feet AGL and is used primarily for tactical military training.
3. 180 degrees Autorotation—Initiated from a downwind heading and is commenced well inside the normal traffic pattern. "Go around" may not be possible during the latter part of this maneuver.

AVIATION WEATHER SERVICE— A service provided by the National Weather Service (NWS) and FAA which collects and disseminates pertinent weather information for pilots, aircraft operators, and ATC. Available aviation weather reports and forecasts are displayed at each NWS office and FAA FSS. (See En Route Flight Advisory Service, Transcribed Weather Broadcast, Weather Advisory, Pilots Automatic Telephone Weather Answering Service) (Refer to AIM)

BASE LEG— (See Traffic Pattern)

BEACON— (See Radar, Nondirectional Beacon, Marker Beacon, Airport Rotating Beacon, Aeronautical Beacon, Airway Beacon))

BEARING— The horizontal direction to or from any point, usually measured clockwise from true north, magnetic north, or some other reference point, through 360 degrees. (See Nondirectional Beacon)

BELOW MINIMUMS— Weather conditions below the minimums prescribed by regulation for the particular action involved; e.g., landing minimums, takeoff minimums.

BLAST FENCE— A barrier that is used to divert or dissipate jet or propeller blast.

BLIND SPEED— The rate of departure or closing of a target relative to the radar antenna at which cancellation of the primary radar target by moving target indicator (MTI) circuits in the radar equipment causes a reduction or complete loss of signal.

*ICAO—BLIND VELOCITY—*The radial velocity of a moving target such that the target is not seen on primary radars fitted with certain forms of fixed echo suppression.

BLIND SPOT/BLIND ZONE— An area from which radio transmissions and/or radar echoes cannot be received. The term is also used to describe portions of the airport not visible from the control tower.

BOUNDARY LIGHTS— (See Airport Lighting)

BRAKING ACTION (GOOD, FAIR, POOR, OR NIL)— A report of conditions on the airport movement area providing a pilot with a degree/quality of braking that he might expect. Braking action is reported in terms of good, fair, poor, or nil. (See Runway Condition Reading)

BRAKING ACTION ADVISORIES— When tower controllers have received runway braking action reports which include the terms "poor" or "nil," or whenever weather conditions are conducive to deteriorating or rapidly changing runway braking conditions, the tower will include on the ATIS broadcast the statement, "BRAKING ACTION ADVISORIES ARE IN EFFECT." During the time Braking Action Advisories are in effect, ATC will issue the latest braking action report for the runway in use to each arriving and departing aircraft. Pilots should be prepared for deteriorating braking conditions and should request current runway condition information if not volunteered by controllers. Pilots should also be prepared to provide a descriptive runway condition report to controllers after landing.

BROADCAST— Transmission of information for which an acknowledgement is not expected.

*ICAO—BROADCAST—*A transmission of information relating to air navigation that is not addressed to a specific station or stations.

CALL UP— Initial voice contact between a facility and an aircraft, using the identification of the unit being called and the unit initiating the call. (Refer to AIM)

CARDINAL ALTITUDES OR FLIGHT LEVELS— "Odd" or "Even" thousand-foot altitudes or flight levels; e.g., 5,000, 6,000, 7,000, FL 250, FL 260, FL 270. (See Altitude, Flight Levels)

CEILING— The heights above the earth's surface of the lowest layer of clouds or obscuring phenomena that is reported as "broken," "overcast," or "obscuration," and not classified as "thin" or "partial".

*ICAO—CEILING—*The height above the ground or water of the base of the lowest layer of cloud below 6,000 meters (20,000 feet) covering more than half the sky.

CELESTIAL NAVIGATION— The determination of geographical position by reference to celestial bodies. Normally used in aviation as a secondary means of position determination.

CENTER— (See Air Route Traffic Control Center)

CENTER'S AREA— The specified airspace within which an air route traffic control center (ARTCC) provides air traffic control and advisory service. (See Air Route Traffic Control Center) (Refer to AIM)

CENTER WEATHER ADVISORY/CWA— An unscheduled weather advisory issued by Center Weather Service Unit meteorologists for ATC use to alert pilots of existing or anticipated adverse weather conditions within the next 2 hours. A CWA may modify or redefine a SIGMET.

CHAFF— Thin, narrow metallic reflectors of various lengths and frequency responses, used to reflect radar energy. These reflectors when dropped from aircraft and allowed to drift downward result in large targets on the radar display.

CHARTED VISUAL FLIGHT PROCEDURE (CVFP) APPROACH— An approach wherein a radar-controlled aircraft on an IFR flight plan, operating in VFR conditions and having an ATC authorization, may proceed to the airport of intended landing via visual landmarks and altitudes depicted on a charted visual flight procedure.

CHASE/CHASE AIRCRAFT— An aircraft flown in proximity to another aircraft normally to observe its performance during training or testing.

CIRCLE-TO-LAND MANEUVER/CIRCLING MANEUVER— A maneuver initiated by the pilot to align the aircraft with a runway for landing when a straight-in landing from an instrument approach is not possible or is not desirable. This maneuver is made only after ATC authorization has been obtained and the pilot has established required visual reference to the airport (See Circle to Runway, Landing Minimums) (Refer to AIM)

CIRCLE TO RUNWAY (RUNWAY NUMBERED)— Used by ATC to inform the pilot that he must circle to land because the runway in use is other than the runway aligned with the instrument approach procedure. When the direction of the circling maneuver in relation to the airport/runway is required, the controller will state the direction (eight cardinal compass points) and specify a left or right downwind or base leg as appropriate; e.g., "Cleared VOR Runway Three Six Approach circle to Runway Two Two," or "Circle northwest of the airport for a right downwind to Runway Two Two." (See Circle-to-Land Maneuver, Landing Minimums) (Refer to AIM)

CIRCLING APPROACH— (See Circle-to-Land Maneuver)

CIRCLING MINIMA— (See Landing Minimums)

CLEAR-AIR TURBULENCE/CAT— Turbulence encountered in air where no clouds are present. This term is commonly applied to high-level turbulence associated with wind shear. CAT is often encountered in the vicinity of the jet stream. (See Wind Shear, Jet Stream)

CLEARANCE— (See Air Traffic Clearance)

CLEARANCE LIMIT— The fix, point, or location to which an aircraft is cleared when issued an air traffic clearance.

*ICAO—CLEARANCE LIMIT—*The point of which an aircraft is granted an air traffic control clearance.

CLEARANCE VOID IF NOT OFF BY (TIME)— Used by ATC to advise an aircraft that the departure clearance is automatically cancelled if takeoff is not made prior to a specified time. The pilot must obtain a new clearance or cancel his IFR flight plan if not off by the specified time.

ICAO—CLEARANCE VOID TIME— A time specified by an air traffic control unit at which a clearance ceases to be valid unless the aircraft concerned has already taken action to comply therewith.

CLEARED AS FILED— Means the aircraft is cleared to proceed in accordance with the route of flight filed in the flight plan. This clearance does not include the altitude, SID, or SID Transition. (See Request Full Route Clearance) (Refer to AIM)

CLEARED FOR (Type Of) APPROACH— ATC authorization for an aircraft to execute a specific instrument approach procedure to an airport; e.g., "Cleared for ILS Runway Three Six Approach." (See Instrument Approach Procedure, Approach Clearance) (Refer to AIM, FAR Part 91)

CLEARED FOR APPROACH— ATC authorization for an aircraft to execute any standard or special instrument approach procedure for that airport. Normally, an aircraft will be cleared for a specific instrument approach procedure. (See Instrument Approach Procedure, Cleared for (Type of) Approach) (Refer to AIM, FAR Part 91)

CLEARED FOR TAKEOFF— ATC authorization for an aircraft to depart. It is predicated on known traffic and known physical airport conditions.

CLEARED FOR THE OPTION— ATC authorization for an aircraft to make a touch-and-go, low approach, missed approach, stop and go, or full stop landing at the discretion of the pilot. It is normally used in training so that an instructor can evaluate a student's performance under changing situations. (See Option Approach) (Refer to AIM)

CLEARED THROUGH— ATC authorization for an aircraft to make intermediate stops at specified airports without refiling a flight plan while en route to the clearance limit.

CLEARED TO LAND— ATC authorization for an aircraft to land. It is predicated on known traffic and known physical airport conditions.

CLEARWAY— An area beyond the takeoff runway under the control of airport authorities within which terrain or fixed obstacles may not extend above specified limits. These areas may be required for certain turbine-powered operations and the size and upward slope of the clearway will differ depending on when the aircraft was certificated. (Refer to FAR Part 1)

CLIMBOUT— That portion of flight operation between takeoff and the initial cruising altitude.

CLIMB TO VFR— ATC authorization for an aircraft to climb to VFR conditions within a control zone when the only weather limitation is restricted visibility. The aircraft must remain clear of clouds while climbing to VFR. (See Special VFR) (Refer to AIM)

CLOSED RUNWAY— A runway that is unusable for aircraft operations. Only the airport management/military operations office can close a runway.

CLOSED TRAFFIC— Successive operations involving takeoffs and landings or low approaches where the aircraft does not exit the traffic pattern.

CLUTTER— In radar operations, clutter refers to the reception and visual display of radar returns caused by precipitation, chaff, terrain, numerous aircraft targets, or other phenomena. Such returns may limit or preclude ATC from providing services based on radar. (See Ground Clutter, Chaff, Precipitation, Target)

*ICAO—Radar Clutter—*The visual indication on a radar display of unwanted signals.

COASTAL FIX— A navigation aid or intersection where an aircraft transitions between the domestic route structure and the oceanic route structure.

CODES/TRANSPONDER CODES— The number assigned to a particular multiple pulse reply signal transmitted by a transponder. (See Discrete Code)

COMBINED CENTER-RAPCON/CERAP— An air traffic facility which combines the functions of an ARTCC and a radar approach control facility. (See Air Route Traffic Control Center/ARTCC, Radar Approach Control Facility)

COMMON ROUTE/COMMON PORTION— That segment of a North American Route between the inland navigation facility and the coastal fix.

COMMON TRAFFIC ADVISORY FREQUENCY/CTAF— A frequency designed for the purpose of carrying out airport advisory practices while operating to or from an uncontrolled airport. The CTAF may be a UNICOM, Multicom, FSS, or tower frequency and is identified in appropriate aeronautical publications. (Refer to AC—90-42C)

COMPASS LOCATOR— A low power, low or medium frequency (L/MF) radio beacon installed at the site of the outer or middle marker of an instrument landing system (ILS). It can be used for navigation at distances of approximately 15 miles or as authorized in the approach procedure.

1. Outer Compass Locator/LOM—A compass locator installed at the site of the outer marker of an instrument landing system. (See Outer Marker)
2. Middle Compass Locator/LMM—A compass locator installed at the site of the middle marker of an instrument landing system. (See Middle Marker)

*ICAO—LOCATOR—*An LM/MF NDB used as an aid to final approach.

COMPASS ROSE— A circle, graduated in degrees, printed on some charts or marked on the ground at an airport. It is used as a reference to either true or magnetic direction.

COMPOSITE FLIGHT PLAN— A flight plan which specifies VFR operation for one portion of flight and IFR for another portion. It is used primarily in military operations. (Refer to AIM)

COMPOSITE ROUTE SYSTEM— An organized oceanic route structure, incorporating reduced lateral spacing between routes, in which composite separation is authorized.

COMPOSITE SEPARATION— A method of separating aircraft in a composite route system where, by management of route and altitude assignments, a combination of half the lateral minimum specified for the area concerned and half the vertical minimum is applied.

COMPULSORY REPORTING POINTS— Reporting points which must be reported to ATC. They are designated on aeronautical charts by solid triangles or filed in a flight plan as fixes selected to define direct routes. These points are geographical locations which are defined by navigation aids/fixes. Pilots should discontinue position reporting over compulsory reporting points when informed by ATC that their aircraft is in "radar contact."

CONFLICT ALERT— A function of certain air traffic control automated systems designed to alert radar controllers to existing or pending situations recognized by the program parameters that require his immediate attention/action.

CONFLICT RESOLUTION— The resolution of potential conflictions between IFR aircraft and VFR aircraft that are radar identified and in communication with ATC by ensuring that radar targets do not touch. Pertinent traffic advisories shall be issued when this procedure is applied. Note: This separation procedure will not be provided utilizing fully digitized radar systems. (See Controlled Airspace—Airport Radar Service Area/ARSA, Outer Area)

CONSOLAN— A low frequency, long-distance NAVAID used principally for transoceanic navigations.

CONTACT—

1. Establish communication with (followed by the name of the facility and, if appropriate, the frequency to be used).
2. A flight condition wherein the pilot ascertains the attitude of his aircraft and navigates by visual reference to the surface. (See Contact Approach, Radar Contact)

CONTACT APPROACH— An approach wherein an aircraft on an IFR flight plan, having an air traffic control authorization, operating clear of clouds with at least 1 mile flight visibility and a reasonable expectation of continuing to the destination airport in those conditions, may deviate from the instrument approach procedure and proceed to the destination airport by visual reference to the surface. This approach will only be authorized when requested by the pilot and the **reported ground visibility** at the destination airport is at least 1 statute mile. (Refer to AIM)

CONTERMINOUS U.S.— The forty-eight adjoining states and the District of Columbia.

CONTINENTAL CONTROL AREA— (See Controlled Airspace)

CONTINENTAL UNITED STATES— The 49 states located on the continent of North America and the District of Columbia.

CONTROL AREA— (See Controlled Airspace)

CONTROLLED AIRSPACE— Airspace designated as a control zone, airport radar service area, terminal control area, transition area, control area, continental control area, positive control area within which some or all aircraft may be subject to air traffic control. (Refer to AIM, FAR Part 71)

ICAO—CONTROLLED AIRSPACE—Airspace of defined dimensions within which air traffic control service is provided to controlled flights.

Types of U.S. Controlled Airspace:

1. Control Zone—Controlled airspace which extends upward from the surface and terminates at the base of the continental control area. Control zones that do not underlie the continental control area have no upper limit. A control zone may include one or more airports and is normally a circular area within a radius of 5 statute miles and any extensions necessary to include instrument approach and departure paths.

ICAO—Control Zone—A controlled airspace extending upwards from the surface of the earth to a specified upper limit.

2. Airport Radar Service Area/ARSA—Regulatory airspace surrounding designated airports wherein ATC provides radar vectoring and sequencing on a full-time basis for all IFR and VFR aircraft. The service provided in an ARSA is called ARSA service which includes: IFR/IFR—standard IFR separation; IFR/VFR—traffic advisories and conflict resolution; and VFR/VFR—traffic advisories and, as appropriate, safety advisories. The AIM contains an explanation of ARSA. The ARSA's are depicted on VFR aeronautical charts. (See Conflict Resolution, Outer Area) (Refer to AIM, Airport/Facility Directory, FAR Part 91)

3. Terminal Control Area/TCA—Controlled airspace extending upward from the surface or higher to specified altitudes, within which all aircraft are subject to operating rules and pilot and equipment requirements specified in FAR Part 91. TCA's are depicted on Sectional, World Aeronautical, En Route Low Altitude, DOD FLIP and TCA charts. (Refer to FAR Part 91, AIM)

ICAO—Terminal Control Area—A control area normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes.

4. Transition Area—Controlled airspace extending upward from 700 feet or more above the surface of the earth when designated in conjunction with an airport for which an approved instrument approach procedure has been prescribed, or from 1,200 feet or more above the surface of the earth when designated in conjunction with airway route structures or segments. Unless otherwise limited, transition areas terminate at the base of the overlying controlled airspace. Transition areas are designed to contain IFR operations in controlled airspace during portions of the terminal operation and while transiting between the terminal and en route environment.

5. Control Area—Airspace designated as Colored Federal Airways, VOR Federal Airways, control areas associated with jet routes outside the continental control area (FAR 71.161), additional control areas (FAR 71.163), control area extensions (FAR 71.165), and area low routes. Control areas do not include the continental control area, but unless otherwise designated, they do include the airspace between a segment of a main VOR Federal Airway and its associated alternate segments with the vertical extent of the area corresponding to the vertical extent of the related segment of the main airway. The vertical extent of the various categories of airspace contained in control areas is defined in FAR Part 71.

ICAO—Control Area—A controlled airspace extending upward from a specified limit above the earth.

6. Continental Control Area—The airspace of the 48 contiguous states, the District of Columbia and Alaska, excluding the Alaska peninsula west of Long. 160° 00′ 00″W, at and above 14,500 feet MSL, but does not include:
    a. The airspace less than 1,500 feet above the surface of the earth or,
    b. Prohibited and restricted areas, other than the restricted areas listed in FAR Part 71.

7. Positive Control Area/PCA—Airspace designated in FAR Part 71 within which there is positive control of aircraft. Flight in PCA is normally conducted under instrument flight rules. PCA is designated throughout most of the conterminous United States and its vertical extent is from 18,000 feet MSL to and including flight level 600. In Alaska PCA does not include the airspace less than 1,500 feet above the surface of the earth, nor the airspace over the Alaska Peninsula west of longitude 160 degrees West. Rules for operating in PCA are found in FARs 91.97 and 91.24.

CONTROLLER— (See Air Traffic Control Specialist)

CONTROL SECTOR— An airspace area of defined horizontal and vertical dimensions for which a controller, or group of controllers, has air traffic control responsibility, normally within an air route traffic control center or an approach control facility. Sectors are established based on predominant traffic flows, altitude strata, and controller workload. Pilot-communications during operations within a sector are normally maintained on discrete frequencies assigned to the sector. (See Discrete Frequency)

CONTROL SLASH— A radar beacon slash representing the actual position of the associated aircraft. Normally, the control slash is the one closest to the interrogating radar beacon site. When ARTCC radar is operating in narrowband (digitized) mode, the control slash is converted to a target symbol.

CONTROL ZONE— (See Controlled Airspace)

***CONVECTIVE SIGMET* /WST/CONVECTIVE SIGNIFICANT METEOROLOGICAL INFORMATION—** A weather advisory concerning convective weather significant to the safety of all aircraft. Convective SIGMET's are issued for tornadoes, lines of thunderstorms, embedded thunderstorms of any intensity level, areas of thunderstorms greater than or equal to VIP level 4 with an areal coverage of 4/10 (40%) or more, and hail 3/4 inch or greater. (See SIGMET, AIRMET) (Refer to AIM)

COORDINATES— The intersection of lines of reference, usually expressed in degrees/minutes/seconds of latitude and longitude, used to determine position or location.

COORDINATION FIX— The fix in relation to which facilities will handoff, transfer control of an aircraft, or coordinate flight progress data. For terminal facilities, it may also serve as a clearance for arriving aircraft.

CORRECTION— An error has been made in the transmission and the correct version follows.

COURSE—

1. The intended direction of flight in the horizontal plane measured in degrees from north.
2. The ILS localizer signal pattern usually specified as front course or back course.

(See Bearing, Radial, Instrument Landing Systems)

CRITICAL ENGINE— The engine which, upon failure, would most adversely affect the performance or handling qualities of an aircraft.

***CROSS (FIX) AT (ALTITUDE)*—** Used by ATC when a specific altitude restriction at a specified fix is required.

***CROSS (FIX) AT OR ABOVE (ALTITUDE)*—** Used by ATC when an altitude restriction at a specified fix is required. It does not prohibit the aircraft from crossing the fix at a higher altitude than specified; however, the higher altitude may not be one that will violate a succeeding altitude restriction or altitude assignment. (See Altitude Assignment, Altitude Restriction.) (Refer to AIM)

***CROSS (FIX) AT OR BELOW (ALTITUDE)*—** Used by ATC when a maximum crossing altitude at a specific fix is required. It does not prohibit the aircraft from crossing the fix at a lower altitude; however, it must be at or above the minimum IFR altitude. (See Minimum IFR Altitude, Altitude Restriction) (Refer to FAR Part 91)

CROSSWIND—

1. When used concerning the traffic pattern, the word means "crosswind leg." (See Traffic Pattern)
2. When used concerning wind conditions, the word means a wind not parallel to the runway or the path of an aircraft. (See Crosswind Component)

CROSSWIND COMPONENT— The wind component measured in knots at 90 degrees to the longitudinal axis of the runway.

***CRUISE*—** Used in an ATC clearance to authorize a pilot to conduct flight at any altitude from the minimum IFR altitude up to and including the altitude specified in the clearance. The pilot may level off at any intermediate altitude within this block of airspace. Climb/descent within the block is to be made at the discretion of the pilot. However, once the pilot starts descent and verbally reports leaving an altitude in the block he may not return to that altitude without additional ATC clearance. Further, it is approval for the pilot to proceed to and make an approach at destination airport and can be used in conjunction with:

1. An airport clearance limit at locations with a standard/special instrument approach procedure. The FARs require that if an instrument letdown to an airport is necessary the pilot shall make the letdown in accordance with a standard/special instrument approach procedure for that airport, or
2. An airport clearance limit at locations that are within/below/outside controlled airspace and without a standard/special instrument approach procedure. Such a clearance is NOT AUTHORIZATION for the pilot to descend under IFR conditions below the applicable minimum IFR altitude nor does it imply that ATC is exercising control over aircraft in uncontrolled airspace; however, it provides a means for the aircraft to proceed to destination airport, descend and land in accordance with applicable FARs governing VFR flight operations. Also, this provides search and rescue protection until such time as the IFR flight plan is closed. (See Instrument Approach Procedure)

CRUISING ALTITUDE/LEVEL— An altitude or flight level maintained during en route level flight. This is a constant altitude and should not be confused with a cruise clearance. (See Altitude)

*ICAO—CRUISING LEVEL—*A level maintained during a significant portion of a flight.

DECISION HEIGHT/DH— With respect to the operation of aircraft, means the height at which a decision must be made during an ILS or PAR instrument approach to either continue the approach or to execute a missed approach.

*ICAO—DECISION HEIGHT—*A specified height at which a missed approach must be initiated if the required visual reference to continue the approach to land has not been established.

DECODER— The device used to decipher signals received from ATCRBS transponders to effect their display as select codes. (See Codes, Radar)

DEFENSE VISUAL FLIGHT RULES/DVFR— Rules applicable to flights within an ADIZ conducted under the visual flight rules in FAR Part 91. (See Air Defense Identification Zone) (Refer to FAR Part 99)

DELAY INDEFINITE (REASON IF KNOWN) EXPECT FURTHER CLEARANCE (TIME)— Used by ATC to inform a pilot when an accurate estimate of the delay time and the reason for the delay cannot immediately be determined; e.g., a disabled aircraft on the runway, terminal or center area saturation, weather below landing minimums, etc. (See Expect Further Clearance)

DEPARTURE CONTROL— A function of an approach control facility providing air traffic control service for departing IFR and, under certain conditions, VFR aircraft. (See Approach Control) (Refer to AIM)

DEPARTURE TIME— The time an aircraft becomes airborne.

DEVIATIONS—

1. A departure from a current clearance, such as an off course maneuver to avoid weather or turbulence.
2. Where specifically authorized in the FAR's and requested by the pilot, ATC may permit pilots to deviate from certain regulations. (Refer to AIM)

DF APPROACH PROCEDURE— Used under emergency conditions where another instrument approach procedure cannot be executed. DF guidance for an instrument approach is given by ATC facilities with DF capability. (See DF Guidance, Direction Finder) (Refer to AIM)

DF FIX— The geographical location of an aircraft obtained by one or more direction finders. (See Direction Finder)

DF GUIDANCE/DF STEER— Headings provided to aircraft by facilities equipped with direction finding equipment. These headings, if followed, will lead the aircraft to a predetermined point such as the DF station or an airport. DF guidance is given to aircraft in distress or to other aircraft which request the service. Practice DF guidance is provided when workload permits. (See Direction Finder, DF Fix) (Refer to AIM)

DIRECT— Straight line flight between two navigational aids, fixes, points or any combination thereof. When used by pilots in describing off-airway routes, points defining direct route segments become compulsory reporting points unless the aircraft is under radar contact.

DIRECT ALTITUDE AND IDENTITY READOUT/DAIR— The DAIR System is a modification to the AN/TPX-42 Interrogator System. The Navy has two adaptations of the DAIR System, Carrier Air Traffic Control Direct Altitude and Identification Readout System for Aircraft Carriers and Radar Air Traffic Control Facility Direct Altitude and Identity Readout System for land based terminal operations. The DAIR detects, tracks, and predicts secondary radar aircraft targets. Targets are displayed by means of computer generated symbols and alphanumeric characters depicting flight identification, altitude, ground speed, and flight plan data. The DAIR System is capable of interfacing with ARTCC's.

DIRECTION FINDER/DF/UDF/VDF/UVDF— A radio receiver equipped with a directional sensing antenna used to take bearings on a radio transmitter. Specialized radio direction finders are used in aircraft as air navigation aids. Others are ground based primarily to obtain a "fix" on a pilot requesting orientation assistance, or to locate downed aircraft. A location "fix" is established by the intersection of two or more bearing lines plotted on a navigational chart using either two separately located Direction Finders to obtain a fix on an aircraft or by a pilot plotting the bearing indications of his DF on two separately located ground based transmitters both of which can be identified on his chart. UDFs receive signals in the ultra high frequency radio broadcast band; VDF's in the very high frequency band; and UVDFs in both bands. ATC provides DF service at those air traffic control towers and flight service stations listed in the Airport/Facility Directory, and DOD FLIP IFR En Route Supplement. (See DF Guidance, DF Fix)

DISCRETE CODE/DISCRETE BEACON CODE— As used in the Air Traffic Control Radar Beacon System (ATCRBS), any one of the 4096 selectable Mode 3/A aircraft transponder codes except those ending in zero zero; e.g., discrete codes: 0010, 1201, 2317, 7777; non-discrete codes: 0100, 1200, 7700. Non-discrete codes are normally reserved for radar facilities that are not equipped with discrete decoding capability and for other purposes such as emergencies (7700), VFR aircraft (1200), etc. (See Radar) (Refer to AIM)

DISCRETE FREQUENCY— A separate radio frequency for use in direct pilot-controller communications in air traffic control which reduces frequency congestion by controlling the number of aircraft operating on a particular frequency at one time. Discrete frequencies are normally designated for each control sector in en route/terminal ATC facilities. Discrete frequencies are listed in the Airport/Facility Directory, and DOD FLIP IFR En Route Supplement. (See Control Sector)

DISPLACED THRESHOLD— A threshold that is located at a point on the runway other than the designated beginning of the runway. (See Threshold) (Refer to AIM)

DISTANCE MEASURING EQUIPMENT/DME— Equipment(airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid. (See TACAN, VORTAC)

DISTRESS— A condition of being threatened by serious and/or imminent, danger, and of requiring immediate assistance.

DME FIX— A geographical position determined by reference to a navigational aid which provides distance and azimuth information. It is defined by a specific distance in nautical miles and a radial or course (i.e., localizer) in degrees magnetic from that aid. (See Distance Measuring Equipment/DME, Fix)

DME SEPARATION— Spacing of aircraft in terms of distances (nautical miles) determined by reference to distance measuring equipment (DME) (See Distance Measuring Equipment).

DOD FLIP— Department of Defense Flight Information Publications used for flight planning, en route, and terminal operations. FLIP is produced by the Defense Mapping Agency for world-wide use. United States Government Flight Information Publications (en route charts and instrument approach procedure charts) are incorporated in DOD FLIP for use in the National Airspace System (NAS).

DOWNWIND LEG— (See Traffic Pattern)

DRAG CHUTE— A parachute device installed on certain aircraft which is deployed on landing roll to assist in deceleration of the aircraft.

EMERGENCY— A DISTRESS or URGENCY condition.

EMERGENCY LOCATOR TRANSMITTER/ELT— A radio transmitter attached to the aircraft structure which operates from its own power source on 121.5 MHz and 243.0 MHz. It aids in locating downed aircraft by radiating a downward sweeping audio tone, 2-4 times per second. It is designed to function without human action after an accident. (Refer to FAR Part 91, AIM)

EMERGENCY SAFE ALTITUDE— (See Minimum Safe Altitude)

E-MSAW— (See En Route Minimum Safe Altitude Warning)

EN ROUTE AIR TRAFFIC CONTROL SERVICES— Air traffic control service provided aircraft on IFR flight plans generally by centers, when these aircraft are operating between departure and destination terminal areas. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft. (See NAS Stage A, Air Route Traffic Control Center) (Refer to AIM)

EN ROUTE AUTOMATED RADAR TRACKING SYSTEM/EARTS— An automated radar and radar beacon tracking system. Its functional capabilities and design are essentially the same as the terminal ARTS IIIA system except for the EARTS capability of employing both short-range (ASR) and long-range (ARSR) radars, use of full digital radar displays, and fail-safe design. (See Automated Radar Terminal Systems/ARTS)

EN ROUTE CHARTS— (See Aeronautical Charts)

EN ROUTE DESCENT— Descent from the en route cruising altitude which takes place along the route of flight.

EN ROUTE FLIGHT ADVISORY SERVICE/FLIGHT WATCH— A service specifically designed to provide, upon pilot request, timely weather information pertinent to his type of flight, intended route of flight and altitude. The FSSs providing this service are listed in The Airport/Facility Directory. (Refer to AIM)

EN ROUTE MINIMUM SAFE ALTITUDE WARNING/E-MSAW— A function of the NAS Stage A en route computer that aids the controller by alerting him when a tracked aircraft is below or predicted by the computer to go below a predetermined minimum IFR altitude (MIA).

EXECUTE MISSED APPROACH— Instructions issued to a pilot making an instrument approach which means continue inbound to the missed approach point and execute the missed approach procedure as described on the Instrument Approach Procedure Chart, or as previously assigned by ATC. The pilot may climb immediately to the altitude specified in the missed approach procedure upon making a missed approach. No turns should be initiated prior to reaching the missed approach point. When conducting an ASR or PAR approach, execute the assigned missed approach procedure immediately upon receiving instructions to "execute missed approach." (Refer to AIM)

EXPECT (ALTITUDE) AT (TIME) or (FIX)— Used under certain conditions in a departure clearance to provide a pilot with an altitude to be used in the event of two-way communication failure. (Refer to AIM)

EXPECT DEPARTURE CLEARANCE (TIME)/EDCT— Used in Fuel Advisory Departure (FAD) program. The time the operator can expect a gate release. Excluding long distance flights, an EDCT will always be assigned even though it may be the same as the Estimated Time of Departure (ETD). The EDCT is calculated by adding the ground delay factor. (See Fuel Advisory Departure)

EXPECT FURTHER CLEARANCE (TIME)/EFC— The time a pilot can expect to receive clearance beyond a clearance limit.

EXPECT FURTHER CLEARANCE VIA (AIRWAYS, ROUTES OR FIXES)— Used to inform a pilot of the routing he can expect if any part of the route beyond a short range clearance limit differs from that filed.

EXPEDITE— Used by ATC when prompt compliance is required to avoid the development of an imminent situation.

FAST FILE— A system whereby a pilot files a flight plan via telephone that is tape recorded and then transcribed for transmission to the appropriate air traffic facility. Locations having a fast file capability are contained in the Airport/Facility Directory. (Refer to AIM)

FEATHERED PROPELLER— A propeller whose blades have been rotated so that the leading and trailing edges are nearly parallel with the aircraft flight path to stop or minimize drag and engine rotation. Normally used to indicate shutdown of a reciprocating or turboprop engine due to malfunction.

FEEDER ROUTE— A route depicted on instrument approach procedure charts to designate routes for aircraft to proceed from the en route structure to the initial approach fix (IAF). (See Instrument Approach Procedure)

FERRY FLIGHT— A flight for the purpose of:

1. Returning an aircraft to base,
2. Delivering an aircraft from one location to another.
3. Moving an aircraft to and from a maintenance base.

Ferry flights, under certain conditions may be conducted under terms of a special flight permit.

FILED— Normally used in conjunction with flight plans, meaning a flight plan has been submitted to ATC.

FILED EN ROUTE DELAY— Any of the following preplanned delays at points/areas along the route of flight which require special flight plan filing and handling techniques.

1. Terminal Area Delay—A delay within a terminal area for touch-and-go, low approach, or other terminal area activity.
2. Special Use Airspace Delay—A delay within a Military Operating Area, Restricted Area, Warning Area, or ATC Assigned Airspace.
3. Aerial Refueling Delay—A delay within an Aerial Refueling Track or Anchor.

FINAL— Commonly used to mean that an aircraft is on the final approach course or is aligned with a landing area. (See Final Approach Course, Final Approach—IFR, Traffic Pattern, Segments of an Instrument Approach Procedure)

FINAL APPROACH COURSE— A straight line extension of a localizer, a final approach radial/bearing, or a runway centerline, all without regard to distance. (See Final Approach— IFR, Traffic Pattern)

FINAL APPROACH FIX/FAF— The designated fix from or over which the final approach (IFR) to an airport is executed. The FAF identifies the beginning of the final approach segment of the instrument approach. (See Final Approach Point, Segments of an Instrument Approach Procedure, Glide Slope Intercept Altitude)

FINAL APPROACH—IFR— The flight path of an aircraft which is inbound to an airport on a final instrument approach course, beginning at the final approach fix or point and extending to the airport or the point where a circle to land maneuver or a missed approach is executed. (See Segments of an Instrument Approach Procedure, Final Approach Fix, Final Approach Course, Final Approach Point)

ICAO—FINAL APPROACH— That part of an instrument approach procedure from the time the aircraft has:

1. Completed the last procedure turn or base turn, where one is specified, or
2. Crossed a specified fix, or
3. Intercepted the last track specified for the procedures until it has crossed a point in the vicinity of an aerodrome from which:
    a. A landing can be made, or
    b. A missed approach procedure is initiated.

FINAL APPROACH POINT— The point, within prescribed limits of an instrument approach procedure, where the aircraft is established on the final approach course and final approach descent may be commenced. A final approach point is applicable only in nonprecision approaches where a final approach fix has not been established. In such instances, the point identifies the beginning of the final approach segment of the instrument approach. (See Final Approach Fix, Segments of an Instrument Approach Procedure, Glide Slope Intercept Altitude)

FINAL APPROACH SEGMENT— (See Segments of an Instrument Approach Procedure)

FINAL APPROACH—VFR— (See Traffic Pattern)

FINAL CONTROLLER— The controller providing information and final approach guidance during PAR and ASR approaches utilizing radar equipment. (See Radar Approach)

FIX— A geographical position determined by visual reference to the surface, by reference to one or more radio NAVAIDs, by celestial plotting, or by another navigational device.

FLAG/FLAG ALARM— A warning device incorporated in certain airborne navigation and flight instruments indicating that:

1. Instruments are inoperative or otherwise not operating satisfactorily, or
2. Signal strength or quality of the received signal falls below acceptable values.

FLAMEOUT— Unintended loss of combustion in turbine engines resulting in the loss of engine power.

FLIGHT CHECK— A call-sign prefix used by FAA aircraft engaged in flight inspection/certification of navigational aids and flight procedures. The word "recorded" may be added as a suffix; e.g., "Flight Check 320 recorded" to indicate that an automated flight inspection is in progress in terminal areas. (See Flight Inspection/Flight Check) (Refer to AIM).

FLIGHT INFORMATION REGION/FIR— An airspace of defined dimensions within which Flight Information Service and Alerting Service are provided.

1. Flight Information Service—A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.
2. Alerting Service—A service provided to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

FLIGHT INSPECTION/FLIGHT CHECK— Inflight investigation and evaluation of a navigational aid to determine whether it meets established tolerances. (See Navigational Aid)

FLIGHT LEVEL— A level of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury. Each is stated in three digits that represent hundreds of feet. For example, flight level 250 represents a barometric altimeter indication of 25,000 feet; flight level 255, an indication of 25,500 feet.

*ICAO—FLIGHT LEVELS—*Surfaces of constant atmospheric pressure which are related to a specific pressure datum, 1013.2 mb (29.92 inches) and are separated by specific pressure intervals.

FLIGHT LINE— A term used to describe the precise movement of a civil photogrammetric aircraft along a predetermined course(s), at a predetermined altitude, during the actual photographic run.

FLIGHT PATH— A line, course, or track along which an aircraft is flying or intended to be flown. (See Track, Course)

FLIGHT PLAN— Specified information relating to the intended flight of an aircraft that is filed orally or in writing with an FSS or an ATC facility. (See Fast File, Filed) (Refer to AIM)

FLIGHT RECORDER— A general term applied to any instrument or device that records information about the performance of an aircraft in flight or about conditions encountered in flight. Flight recorders may make records of airspeed, outside air temperature, vertical acceleration, engine RPM, manifold pressure, and other pertinent variables for a given flight.

*ICAO—FLIGHT RECORDER—*Any type of recorder installed in the aircraft for the purpose of complementing accident/incident investigation.

FLIGHT SERVICE STATION/FSS— Air traffic facilities which provide pilot briefing, en route communications and VFR search and rescue services, assist lost aircraft and aircraft in emergency situations, relay ATC clearances, originate Notices to Airmen, broadcast aviation weather and NAS information, receive and process IFR flight plans and monitor NAVAIDS. In addition, at selected locations FSSs provide Enroute Flight Advisory Service (Flight Watch), take weather observations, issue airport advisories, and advise Customs and Immigration of transborder flights. (Refer to AIM)

FLIGHT STANDARDS DISTRICT OFFICE/FSDO— An FAA field office serving an assigned geographical area, staffed with Flight Standards personnel who serve the aviation industry and the general public on matters relating to the certification and operation of air carrier and general aviation aircraft. Activities include general surveillance of operational safety, certification of airmen and aircraft, accident prevention, investigation, enforcement, etc.

FLIGHT TEST— A flight for the purpose of:

1. Investigating the operation/flight characteristics of an aircraft or aircraft component.
2. Evaluating an applicant for a pilot certificate or rating.

FLIGHT VISIBILITY— (See Visibility)

FLIGHT WATCH— A shortened term for use in air-ground contacts on frequency 122.0 MHz to identify the flight service station providing En Route Flight Advisory Service; e.g., "Oakland Flight Watch." (See En Route Flight Advisory Service)

FLIP— (See DOD FLIP)

FLOW CONTROL— Measures designed to adjust the flow of traffic into a given airspace, along a given route, or bound for a given aerodrome (airport) so as to ensure the most effective utilization of the airspace. (See Quota Flow Control) (Refer to Airport/Facility Directory

FLY HEADING (DEGREES)— Informs the pilot of the heading he should fly. The pilot may have to turn to, or continue on, a specific compass direction in order to comply with the instructions. The pilot is expected to turn in the shorter direction to the heading, unless otherwise instructed by ATC.

FORMATION FLIGHT— More than one aircraft which, by prior arrangement between the pilots, operate as a single aircraft with regard to navigation and position reporting. Separation between aircraft within the formation is the responsibility of the flight leader and the pilots of the other aircraft in the flight. This includes transition periods when aircraft within the formation are maneuvering to attain separation from each other to effect individual control and during join-up and breakaway.

1. A standard formation is one in which a proximity of no more than 1 mile laterally or longitudinally and within 100 feet vertically from the flight leader is maintained by each wingman.

2. Nonstandard formations are those operating under any of the following conditions:

    a. When the flight leader has requested and ATC has approved other than standard formation dimensions.

    b. When operating within an authorized altitude reservation (ALTRV) or under the provisions of a letter of agreement.

    c. When the operations are conducted in airspace specifically designed for a special activity. (See Altitude Reservation) (Refer to FAR Part 91)

FSS— (See Flight Service Station)

FUEL ADVISORY DEPARTURE/FAD— Procedures to minimize engine running time for aircraft destined for an airport experiencing prolonged arrival delays. (Refer to AIM)

FUEL DUMPING— Airborne release of usable fuel. This does not include the dropping of fuel tanks. (See Jettisoning of External Stores)

FUEL SIPHONING/FUEL VENTING— Unintentional release of fuel caused by overflow, puncture, loose cap, etc.

GATE HOLD PROCEDURES— Procedures at selected airports to hold aircraft at the gate or other ground location whenever departure delays exceed or are anticipated to exceed 5 minutes. The sequence for departure will be maintained in accordance with initial call up unless modified by Flow Control restrictions. Pilots should monitor the ground control/clearance delivery frequency for engine startup advisories or new proposed start time if the delay changes. (See Flow Control)

GENERAL AVIATION— That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of public convenience and necessity from the Civil Aeronautics Board and large aircraft commercial operators.

*ICAO—GENERAL AVIATION—*All civil aviation operations other than scheduled air services and nonscheduled air transport operations for remuneration or hire.

GENERAL AVIATION DISTRICT OFFICE/GADO— An FAA field office serving a designated geographical area, staffed with Flight Standards personnel, who have responsibility for serving the aviation industry and the general public on all matters relating to the certification and operation of general aviation aircraft.

GLIDE PATH, (ON/ABOVE/BELOW)— Used by ATC to inform an aircraft making a PAR approach of its vertical position (elevation) relative to the descent profile. The terms "slightly" and "well" are used to describe the degree of deviation; e.g., "slightly above glidepath." Trend information is also issued with respect to the elevation of the aircraft and may be modified by the terms "rapidly" and "slowly;" e.g., "well above glidepath, coming down rapidly." (See PAR Approach)

GLIDE SLOPE/GS— Provides vertical guidance for aircraft during approach and landing. The glide slope consists of the following:

1. Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS, or

2. Visual ground aids, such as VASI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

ICAO—GLIDE PATH— A descent profile determined for vertical guidance during a final approach.

GLIDE SLOPE INTERCEPT ALTITUDE— The minimum altitude of the intermediate approach segment prescribed for a precision approach which assures required obstacle clearance. It is depicted on instrument approach procedure charts. (See Segments of an Instrument Approach Procedure, Instrument Landing System)

GO AHEAD— Proceed with your message. Not to be used for any other purpose.

GO AROUND— Instructions for a pilot to abandon his approach to landing. Additional instructions may follow. Unless otherwise advised by ATC, a VFR aircraft or an aircraft conducting visual approach should overfly the runway while climbing to traffic pattern altitude and enter the traffic pattern via the crosswind leg. A pilot on an IFR flight plan making an instrument approach should execute the published missed approach procedure or proceed as instructed by ATC, e.g., "Go around" (additional instructions, if required). (See Low Approach, Missed Approach)

GROUND CLUTTER— A pattern produced on the radar scope by ground returns which may degrade other radar returns in the affected area. The effect of ground clutter is minimized by the use of moving target indicator (MTI) circuits in the radar equipment resulting in a radar presentation which displays only targets which are in motion. (See Clutter)

GROUND CONTROLLED APPROACH/GCA— A radar approach system operated from the ground by air traffic control personnel transmitting instructions to the pilot by radio. The approach may be conducted with surveillance radar (ASR) only or with both surveillance and precision approach radar (PAR). Usage of the term "GCA" by pilots is discouraged except when referring to a GCA facility. Pilots should specifically request a "PAR" approach when a precision radar approach is desired or request an "ASR" or "surveillance" approach when a nonprecision radar approach is desired. (See Radar Approach)

GROUND SPEED— The speed of an aircraft relative to the surface of the earth.

GROUND VISIBILITY— (See Visibility)

HANDOFF— An action taken to transfer the radar identification of an aircraft from one controller to another if the aircraft will enter the receiving controller's airspace and radio communications with the aircraft will be transferred.

***HAVE NUMBERS*—** Used by pilots to inform ATC that they have received runway, wind, and altimeter information only.

***HEAVY (AIRCRAFT)*—** (See Aircraft Classes)

HEIGHT ABOVE AIRPORT/HAA— The height of the Minimum Descent Altitude above the published airport elevation. This is published in conjunction with circling minimums. (See Minimum Descent Altitude)

HEIGHT ABOVE LANDING/HAL— The height above a designated helicopter landing area used for helicopter instrument approach procedures. (Refer to FAR Part 97)

HEIGHT ABOVE TOUCHDOWN/HAT— The height of the Decision Height or Minimum Descent Altitude above the highest runway elevation in the touchdown zone (first 3,000 feet of the runway). HAT is published on instrument approach charts in conjunction with all straight-in minimums. (See Decision Height, Minimum Descent Altitude)

HELICOPTER/COPTER— Rotorcraft that, for its horizontal motion, depends principally on its engine-driven rotors.

ICAO—HELICOPTER—A heavier-than-air aircraft supported in flight by the reactions of the air on one or more power-driven rotors on substantially vertical axes.

HELIPAD— A small, designated area, usually with a prepared surface, on a heliport, airport, landing/takeoff area, apron/ramp, or movement area used for takeoff, landing, or parking of helicopters.

HELIPORT— An area of land, water, or structure used or intended to be used for the landing and takeoff of helicopters and includes its buildings and facilities, if any.

HERTZ/Hz— The standard radio equivalent of frequency in cycles per second of an electromagnetic wave. Kilohertz (kHz) is a frequency of one thousand cycles per second. Megahertz (MHz) is a frequency of one million cycles per second.

HIGH FREQUENCY COMMUNICATIONS/HF COMMUNICATIONS— High radio frequencies (HF) between 3 and 30 MHz used for air-to-ground voice communication in overseas operations.

HIGH FREQUENCY/HF— The frequency band between 3 and 30 MHz. (See High Frequency Communications)

HIGH SPEED TAXIWAY/EXIT/TURNOFF— A long radius taxiway designed and provided with lighting or marking to define the path of aircraft, traveling at high speed (up to 60 knots), from the runway center to a point on the center of a taxiway. Also referred to as long radius exit or turn-off taxiway. The high speed taxiway is designed to expedite aircraft turning off the runway after landing, thus reducing runway occupancy time.

HOLD/HOLDING PROCEDURE— A predetermined maneuver which keeps aircraft within a specified airspace while awaiting further clearance from air traffic control. Also used during ground operations to keep aircraft within a specified area or at a specified point while awaiting further clearance from air traffic control. (See Holding Fix) (Refer to AIM)

HOLDING FIX— A specified fix identifiable to a pilot by NAVAIDS or visual reference to the ground used as a reference point in establishing and maintaining the position of an aircraft while holding. (See Fix, Hold, Visual Holding) (Refer to AIM)

ICAO—HOLDING POINT— A specified location, identified by visual or other means, in the vicinity of which the position of an aircraft in flight is maintained with air traffic control clearances.

***HOMING*—** Flight toward a NAVAID, without correcting for wind, by adjusting the aircraft heading to maintain a relative bearing of zero degrees. (See Bearing)

ICAO—HOMING—The procedure of using the direction-finding equipment of one radio station with the emission of another radio station, where at least one of the stations is mobile, and whereby the mobile station proceeds continuously towards the other station.

HOVER CHECK— Used to describe when a helicopter/VTOL aircraft requires a stabilized hover to conduct a performance/power check prior to hover taxi, air taxi, or takeoff. Altitude of the hover will vary based on the purpose of the check.

HOVER TAXI— Used to describe a helicopter/VTOL aircraft movement conducted above the surface and in ground effect at airspeeds less than approximately 20 knots. The actual height may vary and some helicopters may require hover taxi above 25 feet AGL to reduce ground effect turbulence or provide clearance for cargo slingloads. (See Air Taxi, Hover Check) (Refer to AIM)

***HOW DO YOU HEAR ME?*—** A question relating to the quality of the transmission or to determine how well the transmission is being received.

***IDENT*—** A request for a pilot to activate the aircraft transponder identification feature. This will help the controller to confirm an aircraft identity or to identify an aircraft. (Refer to AIM)

IDENT FEATURE— The special feature in the Air Traffic Control Radar Beacon System (ATCRBS) equipment. It is used to immediately distinguish one displayed beacon target from other beacon targets. (See IDENT)

IF FEASIBLE, REDUCE SPEED TO (SPEED)— (See Speed Adjustment)

IF NO TRANSMISSION RECEIVED FOR (TIME)— Used by ATC in radar approaches to prefix procedures which should be followed by the pilot in event of lost communications. (See Lost Communications)

IFR AIRCRAFT/IFR FLIGHT— An aircraft conducting flight in accordance with instrument flight rules.

IFR CONDITIONS— Weather conditions below the minimum for flight under visual flight rules. (See Instrument Meteorological Conditions)

IFR DEPARTURE PROCEDURE— (See IFR Takeoff Minimums and Departure Procedures) (Refer to AIM)

IFR MILITARY TRAINING ROUTES (IR)— Routes used by the Department of Defense and associated Reserve and Air Guard units for the purpose of conducting low-altitude navigation and tactical training in both IFR and VFR weather conditions below 10,000 feet MSL at airspeeds in excess of 250 knots IAS.

IFR TAKEOFF MINIMUMS AND DEPARTURE PROCEDURES— FAR, Part 91, prescribes standard takeoff rules for certain civil users. At some airports, obstructions or other factors require the establishment of nonstandard takeoff minimums, departure procedures, or both, to assist pilots in avoiding obstacles during climb to the minimum en route altitude. Those airports are listed in NOS/DOD Instrument Approach Charts (IAPs) under a section entitled "IFR Takeoff Minimums and Departure Procedures." The NOS/DOD IAP chart legend illustrates the symbol used to alert the pilot to nonstandard takeoff minimums and departure procedures. When departing IFR from such airports, or from any airports where there are no departure procedures, SIDs, or ATC facilities available, pilots should advise ATC of any departure limitations. Controllers may query a pilot to determine acceptable departure directions, turns, or headings after takeoff. Pilots should be familiar with the departure procedures and must assure that their aircraft can meet or exceed any specified climb gradients.

ILS CATEGORIES—

1. ILS Category I—An ILS approach procedure which provides for approach to a height above touchdown of not less than 200 feet and with runway visual range of not less than 1,800 feet.
2. ILS Category II—An ILS approach procedure which provides for approach to a height above touchdown of not less than 100 feet and with runway visual range of not less than 1,200 feet.
3. ILS Category III.
    - a. IIIA—An ILS approach procedure which provides for approach without a decision height minimum and with runway visual range of not less than 700 feet.
    - b. IIIB—An ILS approach procedure which provides for approach without a decision height minimum and with runway visual range of not less than 150 feet.
    - c. IIIC—An ILS approach procedure which provides for approach without a decision height minimum and without runway visual range minimum.

IMMEDIATELY— Used by ATC when such action compliance is required to avoid an imminent situation.

INCREASE SPEED TO (SPEED)— (See Speed Adjustment)

INFORMATION REQUEST/INREQ— A request originated by an FSS for information concerning an overdue VFR aircraft.

INITIAL APPROACH FIX/IAF— The fixes depicted on instrument approach procedure charts that identify the beginning of the initial approach segment(s). (See Fix, Segments of an Instrument Approach Procedure)

INITIAL APPROACH SEGMENT— (See Segments of an Instrument Approach Procedure)

INNER MARKER/IM/INNER MARKER BEACON— A marker beacon used with an ILS (CAT II) precision approach located between the middle marker and the end of the ILS runway, transmitting a radiation pattern keyed at six dots per second and indicating to the pilot, both aurally and visually, that he is at the designated decision height (DH), normally 100 feet above the touchdown zone elevation, on the ILS CAT II approach. It also marks progress during a CAT III approach. (See Instrument Landing System) (Refer to AIM)

INSTRUMENT APPROACH PROCEDURE/IAP/INSTRUMENT APPROACH— A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually. It is prescribed and approved for a specific airport by competent authority. (See Segments of an Instrument Approach Procedure) (Refer to FAR Part 91, AIM)

1. U. S. civil standard instrument approach procedures are approved by the FAA as prescribed under FAR, Part 97, and are available for public use.
2. U.S. military standard instrument approach procedures are approved and published by the Department of Defense.
3. Special instrument approach procedures are approved by the FAA for individual operators, but are not published in FAR, Part 97, for public use.

ICAO—INSTRUMENT APPROACH PROCEDURE— A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

INSTRUMENT FLIGHT RULES/IFR— Rules governing the procedures for conducting instrument flight. Also a term used by pilots and controllers to indicate type of flight plan. (See Visual Flight Rules, Instrument Meteorological Conditions, Visual Meteorological Conditions) (Refer to AIM)

ICAO—INSTRUMENT FLIGHT RULES—A set of rules governing the conduct of flight under instrument meteorological conditions.

INSTRUMENT LANDING SYSTEM/ILS— A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer (See Localizer)
2. Glide Slope (See Glide Slope)
3. Outer Marker (See Outer Marker)
4. Middle Marker (See Middle Marker)
5. Approach Lights (See Airport Lighting)

(Refer to FAR Part 91, AIM)

INSTRUMENT METEOROLOGICAL CONDITIONS/IMC— Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling less than the minima specified for visual meteorological conditions. (See Visual Meteorological Conditions, Instrument Flight Rules, Visual Flight Rules)

INSTRUMENT RUNWAY— A runway equipped with electronic and visual navigation aids for which a precision or nonprecision approach procedure having straight-in landing minimums has been approved.

ICAO—INSTRUMENT RUNWAY—A runway intended for the operation of aircraft using nonvisual aids and comprising:

1. Instrument Approach Runway—An instrument runway served by a nonvisual aid providing at least directional guidance adequate for a straight-in approach.
2. Precision Approach Runway, Category I—An instrument runway served by ILS or GCA approach aids and visual aids intended for operations down to 60 metres (200 feet) decision height and down to an RVR of the order of 800 metres (2,600 feet.)
3. Precision Approach Runway, Category II—An instrument runway served by ILS and visual aids intended for operations down to 30 metres (100 feet) decision height and down to an RVR of the order of 400 metres (1,200 feet.)
4. Precision Approach Runway, Category III—An instrument runway served by ILS (no decision height being applicable) and:
    a. By visual aids intended for operations down to an RVR of the order of 200 metres (700 feet);
    b. By visual aids intended for operations down to an RVR of the order of 50 metres (150 feet);
    c. Intended for operations without reliance on external visual reference.

INTERMEDIATE APPROACH SEGMENT— (See Segments of an Instrument Approach Procedure)

INTERMEDIATE FIX/IF— The fix that identifie the beginning of the intermediate approach segment of an instrument approach procedure. The fix is not normally identified on the instrument approach chart as an intermediate fix (IF). (See Segments of an Instrument Approach Procedure)

INTERNATIONAL AIRPORT— Relating to international flight, it means:

1. An airport of entry which has been designated by the Secretary of Treasury or Commissioner of Customs as an international airport for customs service.
2. A landing rights airport at which specific permission to land must be obtained from customs authorities in advance of contemplated use.
3. Airports designated under the Convention on International Civil Aviation as an airport for use by international commercial air transport and/or international general aviation. (Refer to Airport/Facility Directory and IFIM).

ICAO- INTERNATIONAL AIRPORT—Any airport designated by the Contracting State in whose territory it is situated as an airport of entry and departure for international air traffic, where the formalities incident to customs, immigration, public health, animal and plant quarantine, and similar procedures are carried out.

INTERNATIONAL CIVIL AVIATION ORGANIZATION/ICAO— A specialized agency of the United Nations whose objective is to develop the principles and techniques of international air navigation and to foster planning and development of international civil air transport.

INTERNATIONAL FLIGHT INFORMATION MANUAL/IFIM— A publication designed primarily as a pilot's preflight planning guide for flights into foreign airspace and for flights returning to the U.S. from foreign locations.

INTERROGATOR— The ground-based surveillance radar beacon transmitter-receiver, which normally scans in synchronism with a primary radar, transmitting discrete radio signals which repetitiously request all transponders, on the mode being used, to reply. The replies received are mixed with the primary radar returns and displayed on the same plan position indicator (radar scope). Also applied to the airborne element of the TACAN/DME system. (See Transponder) (Refer to AIM)

INTERSECTING RUNWAYS— Two or more runways which cross or meet within their lengths. (See Intersection)

INTERSECTION—

1. A point defined by any combination of courses, radials or bearings of two or more navigational aids.
2. Used to describe the point where two runways, a runway and a taxiway, or two taxiways cross or meet.

INTERSECTION DEPARTURE/INTERSECTION TAKEOFF— A takeoff or proposed takeoff on a runway from an intersection. (See Intersection)

I SAY AGAIN— The message will be repeated.

JAMMING— Electronic or mechanical interference which may disrupt the display of aircraft on radar or the transmission/reception of radio communications/ navigation.

JET BLAST— Jet engine exhaust (thrust stream turbulence). (See Wake Turbulence)

JET ROUTE— A route designed to serve aircraft operations from 18,000 feet MSL up to and including flight level 450. The routes are referred to as "J" routes with numbering to identify the designated route; e.g., J105. (See Route) (Refer to FAR Part 71)

JET STREAM— A migrating stream of high-speed winds present at high altitudes.

JETTISONING OF EXTERNAL STORES— Airborne release of external stores; e.g., tiptanks, ordinances (See Fuel Dumping) (Refer to FAR Part 91)

JOINT USE RESTRICTED AREA— (See Restricted Area)

KNOWN TRAFFIC— With respect to ATC clearances, means aircraft whose altitude, position and intentions are known to ATC.

LANDING/TAKEOFF AREA— Any locality either on land, water, or structures, including airports/heliports and intermediate landing fields, which is used, or intended to be used, for the landing and takeoff of aircraft whether or not facilities are provided for the shelter, servicing, or for receiving or discharging passengers or cargo.

ICAO—LANDING AREA—That part of the movement area intended for the landing and takeoff of aircraft.

LANDING DIRECTION INDICATOR— A device which visually indicates the direction in which landings and takeoffs should be made. (See Tetrahedron) (Refer to AIM)

LANDING MINIMUMS/IFR LANDING MINIMUMS— The minimum visibility prescribed for landing a civil aircraft while using an instrument approach procedure. The minimum applies with other limitations set forth in FAR Part 91 with respect to the Minimum Descent Altitude (MDA) or Decision Height (DH) prescribed in the instrument approach procedures as follows:

1. Straight-in landing minimums—A statement of MDA and visibility, or DH and visibility, required for straight-in landing on a specified runway, or
2. Circling minimums— A statement of MDA and visibility required for the circle-to-land maneuver.

Descent below the established MDA or DH is not authorized during an approach unless the aircraft is in a position from which a normal approach to the runway of intended landing can be made and adequate visual reference to required visual cues is maintained. (See Straight-in Landing, Circle-to-Land Maneuver, Decision Height, Minimum Descent Altitude, Visibility, Instrument Approach Procedure) (Refer to FAR Part 91)

LANDING ROLL— The distance from the point of touchdown to the point where the aircraft can be brought to a stop or exit the runway.

LANDING SEQUENCE— The order in which aircraft are positioned for landing. (See Approach Sequence)

LAST ASSIGNED ALTITUDE— The last altitude/ flight level assigned by ATC and acknowledged by the pilot. (See Maintain) (Refer to FAR Part 91)

LATERAL SEPARATION— The lateral spacing of aircraft at the same altitude by requiring operation on different routes or in different geographical locations. (See Separation)

LIGHTED AIRPORT— An airport where runway and obstruction lighting is available. (See Airport Lighting) (Refer to AIM)

LIGHT GUN— A handheld directional light signaling device which emits a brilliant narrow beam of white, green, or red light as selected by the tower controller. The color and type of light transmitted can be used to approve or disapprove anticipated pilot actions where radio communication is not available. The light gun is used for controlling traffic operating in the vicinity of the airport and on the airport movement area. (Refer to AIM)

LOCALIZER— The component of an ILS which provides course guidance to the runway. (See Instrument Landing System) (Refer to AIM)

ICAO—LOCALIZER COURSE (ILS)— The locus of points, in any given horizontal plane, at which the DDM (difference in depth of modulation) is zero.

LOCALIZER TYPE DIRECTIONAL AID/LDA— A NAVAID used for nonprecision instrument approaches with utility and accuracy comparable to a localizer but which is not a part of a complete ILS and is not aligned with the runway. (Refer to AIM)

LOCALIZER USABLE DISTANCE— The maximum distance from the localizer transmitter at a specified altitude, as verified by flight inspection, at which reliable course information is continuously received. (Refer to AIM)

LOCAL TRAFFIC— Aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from flight in local practice areas, or aircraft executing practice instrument approaches at the airport. (See Traffic Pattern)

LONGITUDINAL SEPARATION— The longitudinal spacing of aircraft at the same altitude by a minimum distance expressed in units of time or miles. (See Separation) (Refer to AIM)

LORAN/LONG RANGE NAVIGATION— An electronic navigational system by which hyperbolic lines of position are determined by measuring the difference in the time of reception of synchronized pulse signals from two fixed transmitters. Loran A operates in the 1750—1950 kHz frequency band. Loran C and D operate in the 100—110 kHz frequency band. (Refer to AIM)

LOST COMMUNICATIONS/TWO-WAY RADIO COMMUNICATIONS FAILURE— Loss of the ability to communicate by radio. Aircraft are sometimes referred to as NORDO (No Radio). Standard pilot procedures are specified in FAR Part 91. Radar controllers issue procedures for pilots to follow in the event of lost communications during a radar approach when weather reports indicate that an aircraft will likely encounter IFR weather conditions during the approach. (Refer to FAR Part 91, AIM)

LOW ALTITUDE AIRWAY STRUCTURE/FEDERAL AIRWAYS— The network of airways serving aircraft operations up to but not including 18,000 feet MSL. (See Airway) (Refer to AIM)

LOW ALTITUDE ALERT, CHECK YOUR ALTITUDE IMMEDIATELY— (See Safety Advisory)

LOW ALTITUDE ALERT SYSTEM/LAAS— An automated function of the TPX-42 that alerts the controller when a Mode C transponder-equipped aircraft on an IFR flight plan is below a predetermined minimum safe altitude. If requested by the pilot, LAAS monitoring is also available to VFR Mode C transponder-equipped aircraft.

LOW APPROACH— An approach over an airport or runway following an instrument approach or a VFR approach including the go-around maneuver where the pilot intentionally does not make contact with the runway. (Refer to AIM)

LOW FREQUENCY/LF— The frequency band between 30 and 300 kHz. (Refer to AIM)

MACH NUMBER— The ratio of true airspeed to the speed of sound; e.g., MACH .82, MACH 1.6. (See Airspeed)

MAINTAIN—

1. Concerning altitude/flight level, the term means to remain at the altitude/flight level specified. The phrase "climb and" or "descend and" normally precedes "maintain" and the altitude assignment; e.g., "descend and maintain 5,000."
2. Concerning other ATC instructions, the term is used in its literal sense; e.g., maintain VFR.

MAKE SHORT APPROACH— Used by ATC to inform a pilot to alter his traffic pattern so as to make a short final approach. (See Traffic Pattern)

MANDATORY ALTITUDE— An altitude depicted on an instrument Approach Procedure Chart requiring the aircraft to maintain altitude at the depicted value.

MARKER BEACON— An electronic navigation facility transmitting a 75 MHz vertical fan or boneshaped radiation pattern. Marker beacons are identified by their modulation frequency and keying code, and when received by compatible airborne equipment, indicate to the pilot, both aurally and visually, that he is passing over the facility. (See Outer Marker, Middle Marker, Inner Marker).(Refer to AIM)

MAXIMUM AUTHORIZED ALTITUDE/MAA— A published altitude representing the maximum usable altitude or flight level for an airspace structure or route segment. It is the highest altitude on a Federal airway, Jet route, area navigation low or high route, or other direct route for which an MEA is designated in FAR Part 95 at which adequate reception of navigation aid signals is assured.

MAYDAY— The international radiotelephony distress signal. When repeated three times, it indicates imminent and grave danger and that immediate assistance is requested. (See PAN) (Refer to AIM)

METEOROLOGICAL IMPACT STATEMENT/MIS— An unscheduled planning forecast describing conditions expected to begin within 4 to 12 hours which may impact the flow of air traffic in a specific center's (ARTCC) area.

METERING— A method of time-regulating arrival traffic flow into a terminal area so as not to exceed a predetermined terminal acceptance rate.

METERING FIX— A fix along an established route from over which aircraft will be metered prior to entering terminal airspace. Normally, this fix should be established at a distance from the airport which will facilitate a profile descent 10,000 feet above airport elevation (AAE) or above.

MIA— (See Minimum IFR Altitudes)

MICROWAVE LANDING SYSTEM/MLS— An instrument landing system operating in the microwave spectrum which provides lateral and vertical guidance to aircraft having compatible avionics equipment. (See Instrument Landing System) (Refer to AIM)

MIDDLE COMPASS LOCATOR— (See Compass Locator)

MIDDLE MARKER/MM— A marker beacon that defines a point along the glide slope of an ILS normally located at or near the point of decision height (ILS Category I). It is keyed to transmit alternate dots and dashes, with the alternate dots and dashes keyed at the rate of 95 dot/dash combinations per minute, on a 1300 Hz tone, which is received aurally and visually by compatible airborne equipment. (See Marker Beacon, Instrument Landing System) (Refer to AIM)

MID RVR— (See Visibility)

MILITARY AUTHORITY ASSUMES RESPONSIBILITY FOR SEPARATION OF AIRCRAFT/MARSA—A condition whereby the military services involved assume responsibility for separation between participating military aircraft in the ATC system. It is used only for required IFR operations which are specified in letters of agreement or other appropriate FAA or military documents.

MILITARY OPERATIONS AREA/MOA— (See Special Use Airspace)

MILITARY TRAINING ROUTES/MTR— Airspace of defined vertical and lateral dimensions established for the conduct of military flight training at airspeeds in excess of 250 knots IAS. (See IFR (IR) and VFR (VR) Military Training Routes)

MINIMUM CROSSING ALTITUDE/MCA— The lowest altitude at certain fixes at which an aircraft must cross when proceeding in the direction of a higher minimum en route IFR altitude (MEA). (See Minimum En Route IFR Altitude)

MINIMUM DESCENT ALTITUDE/MDA— The lowest altitude, expressed in feet above mean sea level, to which descent is authorized on final approach or during circle-to-land maneuvering in execution of a standard instrument approach procedure where no electronic glide slope is provided. (See Nonprecision Approach Procedure)

MINIMUM EN ROUTE IFR ALTITUDE/MEA— The lowest published altitude between radio fixes which assures acceptable navigational signal coverage and meets obstacle clearance requirements between those fixes. The MEA prescribed for a Federal airway or segment thereof, area navigation low or high route or other direct route applies to the entire width of the airway, segment or route between the radio fixes defining the airway, segment, or route. (Refer to FAR Parts 91 and 95; AIM)

MINIMUM FUEL— Indicates that an aircraft's fuel supply has reached a state where, upon reaching the destination, it can accept little or no delay. This is not an emergency situation but merely indicates an emergency situation is possible should any undue delay occur. (Refer to AIM)

MINIMUM HOLDING ALTITUDE/MHA— The lowest altitude prescribed for a holding pattern which assures navigational signal coverage, communications, and meets obstacle clearance requirements.

MINIMUM IFR ALTITUDES/MIA— Minimum altitudes for IFR operations as prescribed in FAR Part 91. These altitudes are published on aeronautical charts and prescribed in FAR Part 95 for airways and routes, and in FAR Part 97 for standard instrument approach procedures. If no applicable minimum altitude is prescribed in FAR Parts 95 or 97, the following minimum IFR altitude applies:

1. In designated mountainous areas, 2,000 feet above the highest obstacle within a horizontal distance of 5 statute miles from the course to be flown; or
2. Other than mountainous areas, 1,000 feet above the highest obstacle within a horizontal distance of 5 statute miles from the course to be flown; or
3. As otherwise authorized by the Administrator or assigned by ATC. (See Minimum En Route IFR Altitude, Minimum Obstruction Clearance Altitude, Minimum Crossing Altitude, Minimum Safe Altitude, Minimum Vectoring Altitude) (Refer to FAR Part 91)

MINIMUM OBSTRUCTION CLEARANCE ALTITUDE/MOCA— The lowest published altitude in effect between radio fixes on VOR airways, off-airway routes, or route segments which meets obstacle clearance requirements for the entire route segment and which assures acceptable navigational signal coverage only within 25 statute (22 nautical) miles of a VOR. (Refer to FAR Part 91 and 95)

MINIMUM RECEPTION ALTITUDE/MRA— The lowest altitude at which an intersection can be determined. (Refer to FAR Part 95)

MINIMUM SAFE ALTITUDE/MSA—

1. The minimum altitude specified in FAR Part 91 for various aircraft operations.
2. Altitudes depicted on approach charts which provide at least 1,000 feet of obstacle clearance for emergency use within a specified distance from the navigation facility upon which a procedure is predicated. These altitudes will be identified as MINIMUM SECTOR ALTITUDES or EMERGENCY SAFE ALTITUDES and are established as follows:
    a. Minimum Sector Altitudes—Altitudes depicted on approach charts which provide at least 1,000 feet of obstacle clearance within a 25-mile radius of the navigation facility upon which the procedure is predicated. Sectors depicted on approach charts must be at least 90 degrees in scope. These altitudes are for emergency use only and do not necessarily assure acceptable navigational signal coverage.

ICAO—MINIMUM SECTOR ALTITUDE— The lowest altitude which may be used under emergency conditions which will provide a minimum clearance of 300 meters (1,000 feet) above all obstacles located in an area contained within a sector of a circle of 25 nautical mile radius centered on a radio aid to navigation.

    b. Emergency Safe Altitudes—Altitudes depicted on approach charts which provide at least 1,000 feet of obstacle clearance in nonmountainous areas and 2,000 feet of obstacle clearance in designated mountainous areas within a 100-mile radius of the navigation facility upon which the procedure is predicated and normally used only in military procedures. These altitudes are identified on published procedures as "Emergency Safe Altitudes."

MINIMUM SAFE ALTITUDE WARNING (MSAW)— A function of the ARTS III computer that aids the controller by alerting him when a tracked Mode C equipped aircraft is below or is predicted by the computer to go below a predetermined minimum safe altitude. (Refer to AIM)

MINIMUMS/MINIMA— Weather condition requirements established for a particular operation or type of operation; e.g., IFR takeoff or landing, alternate airport for IFR flight plans, VFR flight, etc. (See Landing Minimums, IFR Takeoff Minimums, VFR Conditions, IFR Conditions) (Refer to FAR Part 91, AIM)

MINIMUM VECTORING ALTITUDE/MVA— The lowest MSL altitude at which an IFR aircraft will be vectored by a radar controller, except as otherwise authorized for radar approaches, departures and missed approaches. The altitude meets IFR obstacle clearance criteria. It may be lower than the published MEA along an airway or J-route segment. It may be utilized for radar vectoring only upon the controller's determination that an adequate radar return is being received from the aircraft being controlled. Charts depicting minimum vectoring altitudes are normally available only to the controllers and not to pilots. (Refer to AIM)

MISSED APPROACH—

1. A maneuver conducted by a pilot when an instrument approach cannot be completed to a landing. The route of flight and altitude are shown on instrument approach procedure charts. A pilot executing a missed approach prior to the Missed Approach Point (MAP) must continue along the final approach to the MAP. The pilot may climb immediately to the altitude specified in the missed approach procedure.
2. A term used by the pilot to inform ATC that he is executing the missed approach.
3. At locations where ATC radar service is provided, the pilot should conform to radar vectors, when provided by ATC, in lieu of the published missed approach procedure. (See Missed Approach Point) (Refer to AIM)

ICAO—MISSED APPROACH PROCEDURE— The procedure to be followed if, after an instrument approach, a landing is not effected, and occuring normally:

1. When the aircraft has descended to the decision height and has not established visual contact, or
2. When directed by air traffic control to pull up or to go around again.

MISSED APPROACH POINT/MAP— A point prescribed in each instrument approach procedure at which a missed approach procedure shall be executed if the required visual reference does not exist. (See Missed Approach, Segments of an Instrument Approach Procedure)

MISSED APPROACH SEGMENT— (See Segments of an Instrument Approach Procedure)

MODE— The letter or number assigned to a specific pulse spacing of radio signals transmitted or received by ground interrogator or airborne transponder components of the Air Traffic Control Radar Beacon System (ATCRBS). Mode A (military Mode 3) and Mode C (altitude reporting) are used in air traffic control. (See Transponder, Interrogator, Radar) (Refer to AIM)

ICAO—MODE (SSR MODE)— The letter or number assigned to a specific pulse spacing of the interrogation signals transmitted by an interrogator. There are 4 modes, A, B, C and D corresponding to four different interrogation pulse spacings.

MOVEMENT AREA— The runways, taxiways, and other areas of an airport/heliport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports/heliports with a tower, specific approval for entry onto the movement area must be obtained from ATC.

ICAO—MOVEMENT AREA— That part of an aerodrome intended for the surface movement of aircraft, including the maneuvering area and aprons.

MOVING TARGET INDICATOR/MTI— An electronic device which will permit radar scope presentation only from targets which are in motion. A partial remedy for ground clutter.

MSAW— (See Minimum Safe Altitude Warning)

NAS STAGE A— The en route ATC system's radar, computers and computer programs, controller plan view displays (PVDs/Radar Scopes), input/output devices, and the related communications equipment which are integrated to form the heart of the automated IFR air traffic control system. This equipment performs Flight Data Processing (FDP) and Radar Data Processing (RDP). It interfaces with automated terminal systems and is used in the control of en route IFR aircraft. (Refer to AIM)

NATIONAL AIRSPACE SYSTEM/NAS— The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower and material. Included are system components shared jointly with the military.

NATIONAL BEACON CODE ALLOCATION PLAN AIRSPACE/NBCAP AIRSPACE— Airspace over United States territory located within the North American continent between Canada and Mexico, including adjacent territorial waters outward to about boundaries of oceanic control areas (CTA)/Flight Information Regions (FIR). (See Flight Information Region)

NATIONAL FLIGHT DATA CENTER/NFDC— A facility in Washington D.C., established by FAA to operate a central aeronautical information service for the collection, validation, and dissemination of aeronautical data in support of the activities of government, industry, and the aviation community. The information is published in the National Flight Data Digest. (See National Flight Data Digest)

NATIONAL FLIGHT DATA DIGEST/NFDD— A daily (except weekends and federal holidays) publication of flight information appropriate to aeronautical charts, aeronautical publications, Notices to Airmen or other media serving the purpose of providing operational flight data essential to safe and efficient aircraft operations.

NATIONAL SEARCH AND RESCUE PLAN— An interagency agreement which provides for the effective utilization of all available facilities in all types of search and rescue missions.

NAVAID CLASSES— VOR, VORTAC, and TACAN aids are classed according to their operational use. The three classes of NAVAIDS are:

T—Terminal

L—Low altitude

H—High altitude

The normal service range for T, L, and H class aids is found in the AIM. Certain operational requirements make it necessary to use some of these aids at greater service ranges than specified. Extended range is made possible through flight inspection determinations. Some aids also have lesser service range due to location, terrain, frequency protection, etc. Restrictions to service range are listed in Airport/Facility Directory.

NAVIGABLE AIRSPACE— Airspace at and above the minimum flight altitudes prescribed in the FARs including airspace needed for safe takeoff and landing. (Refer to FAR Part 91)

NAVIGATIONAL AID/NAVAID— Any visual or electronic device airborne or on the surface which provides point to point guidance information or position data to aircraft in flight. (See Air Navigation Facility)

NDB— (See Nondirectional beacon)

NEGATIVE— "No" or "permission not granted" or "that is not correct."

NEGATIVE CONTACT— Used by pilots to inform ATC that:

1. Previously issued traffic is not in sight. It may be followed by the pilot's request for the controller to provide assistance in avoiding the traffic.
2. They were unable to contact ATC on a particular frequency.

NIGHT— The time between the end of evening civil twilight and the beginning of morning civil twilight, as published in the American Air Almanac, converted to local time.

ICAO—NIGHT— The hours between the end of evening civil twilight and the beginning of morning civil twilight or such other period between sunset and sunrise as may be specified by the appropriate authority.

NO GYRO APPROACH/VECTOR— A radar approach/vector provided in case of a malfunctioning gyro-compass or directional gyro. Instead of providing the pilot with headings to be flown, the controller observes the radar track and issues control instructions "turn right/left" or "stop turn" as appropriate. (Refer to AIM)

NONAPPROACH CONTROL TOWER— Authorizes aircraft to land or takeoff at the airport controlled by the tower, or to transit the airport traffic area. The primary function of a nonapproach control tower is the sequencing of aircraft in the traffic pattern and on the landing area. Nonapproach control towers also separate aircraft operating under instrument flight rules clearances from approach controls and centers. They provide ground control services to aircraft, vehicles, personnel, and equipment on the airport movement area.

NONCOMPOSITE SEPARATION— Separation in accordance with minima other than the composite separation minimum specified for the area concerned.

NONDIRECTIONAL BEACON/RADIO BEACON/NDB— An L/MF or UHF radio beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his bearing to or from the radio beacon and "home" on or track to or from the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator. (See Compass Locator, Automatic Direction Finder)

NONPRECISION APPROACH PROCEDURE/NONPRECISION APPROACH— A standard instrument approach procedure in which no electronic glide slope is provided; e.g., VOR, TACAN, NDB, LOC, ASR, LDA, or SDF approaches.

NONRADAR— Precedes other terms and generally means without the use of radar, such as:

1. Nonradar Route—A flight path or route over which the pilot is performing his own navigation. The pilot may be receiving radar separation, radar monitoring or other ATC services while on a nonradar route. (See Radar Route)
2. Nonradar Approach—Used to describe instrument approaches for which course guidance on final approach is not provided by ground based precision or surveillance radar. Radar vectors to the final approach course may or may not be provided by ATC. Examples of nonradar approaches are VOR, ADF, TACAN, and ILS, approaches. (See Final Approach—IFR, Final Approach Course, Radar Approach, Instrument Approach Procedure)
3. Nonradar Separation—The spacing of aircraft in accordance with established minima without the use of radar; e.g., vertical, lateral, or longitudinal separation. (See Radar Separation)

ICAO—NonRadar Separation— The separation used when aircraft position information is derived from sources other than radar.

4. Nonradar Arrival—An arriving aircraft that is not being vectored to the final approach course for an instrument approach or towards the airport for a visual approach. The aircraft may or may not be in a radar environment and may or may not be receiving radar separation, radar monitoring or other services provided by ATC. (See Radar Arrival, Radar Environment)

NONRADAR APPROACH CONTROL— An ATC facility providing approach control service without the use of radar. (See Approach Control, Approach Control Service)

NORDO— (See Lost Communications)

NORTH AMERICAN ROUTE— A numerically coded route preplanned over existing airway and route systems to and from specific coastal fixes serving the North Atlantic. North American Routes consist of the following:

1. Common Route/Portion—That segment of a North American route between the inland navigation facility and the coastal fix.
2. Non-Common Route/Portion—That segment of a North American route between the inland navi-

gation facility and a designated North American terminal.

3. Inland Navigation Facility—A navigation aid on a North American route at which the common route and/or the non-common route begins or ends.
4. Coastal Fix—A navigation aid or intersection where an aircraft transitions between the domestic route structure and the oceanic route structure.

NOTICES TO AIRMEN PUBLICATION— A publication designed primarily as a pilot's operational manual containing current NOTAM information considered essential to the safety of flight as well as supplemental data to other aeronautical publications. (See Notice to Airmen/NOTAM)

NOTICE TO AIRMEN/NOTAM— A notice containing information (not known sufficiently in advance to publicize by other means) concerning the establishment, condition or change in any component (facility, service, or procedure of, or hazard in the National Airspace System) the timely knowledge of which is essential to personnel concerned with flight operations.

1. NOTAM(D)—A NOTAM given (in addition to local dissemination) distant dissemination via teletypewriter beyond the area of responsibility of the Flight Service Station. These NOTAMS will be stored and repeated hourly until cancelled.
2. NOTAM(L)—A NOTAM given local dissemination by voice, (teletypewriter where applicable), and a wide variety of means such as: telautograph, teleprinter, facsimile reproduction, hot line, telecopier, telegraph, and telephone to satisfy local user requirements.
3. FDC NOTAM—A notice to airmen, regulatory in nature, transmitted by NFDC and given all-circuit dissemination.

ICAO--NOTAM— A notice, containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.

NUMEROUS TARGETS VICINITY (LOCATION)— A traffic advisory issued by ATC to advise pilots that targets on the radar scope are too numerous to issue individually. (See Traffic Advisories)

OBSTACLE— An existing object, object of natural growth, or terrain at a fixed geographical location, or which may be expected at a fixed location within a prescribed area, with reference to which vertical clearance is or must be provided during flight operation.

OBSTRUCTION— Any object/obstacle exceeding the obstruction standards specified by FAR Part 77, Subpart C.

OBSTRUCTION LIGHT— A light, or one of a group of lights, usually red or white, frequently mounted on a surface structure or natural terrain to warn pilots of the presence of an obstruction.

OFF-ROUTE VECTOR— A vector by ATC which takes an aircraft off a previously assigned route. Altitudes assigned by ATC during such vectors provide required obstacle clearance.

OFFSET PARALLEL RUNWAYS— Staggered runways having centerlines which are parallel.

ON COURSE—

1. Used to indicate that an aircraft is established on the route centerline.
2. Used by ATC to advise a pilot making a radar approach that his aircraft is lined up on the final approach course. (See On-Course Indication)

ON-COURSE INDICATION— An indication on an instrument which provides the pilot a visual means of determining that the aircraft is located on the centerline of a given navigational track; or an indication on a radar scope that an aircraft is on a given track.

OPTION APPROACH— An approach requested and conducted by a pilot which will result in either a touch-and-go, missed approach, low approach, stop-and-go or full stop landing. (See Cleared for the option) (Refer to AIM)

ORGANIZED TRACK SYSTEM— A moveable system of oceanic tracks that traverses the North Atlantic between Europe and North America the physical position of which is determined twice daily taking the best advantage of the winds aloft.

OUT— The conversation is ended and no response is expected.

OUTER AREA (associated with ARSA)—Nonregulatory airspace surrounding designated ARSA airports wherein ATC provides radar vectoring and sequencing on a full-time basis for all IFR and participating VFR aircraft. The service provided in the outer area is called ARSA service which includes: IFR/IFR—standard IFR separation; IFR/VFR—traffic advisories and conflict resolution; and VFR/VFR—traffic advisories and, as appropriate, safety advisories. The normal radius will be 20 nautical miles, with some variations based on site specific requirements. The outer area extends outward from the primary ARSA airport and extends from the lower limits of radar/radio coverage up to the ceiling of the approach control's delegated airspace excluding the ARSA and other airspace as appropriate. (See Controlled Airspace—Airport Radar Service Area/ARSA, Conflict Resolution)

OUTER COMPASS LOCATOR— (See Compass Locator)

OUTER FIX— A general term used within ATC to describe fixes in the terminal area, other than the final approach fix. Aircraft are normally cleared to these fixes by an Air Route Traffic Control Center or an Approach Control Facility. Aircraft are normally cleared from these fixes to the final approach fix or final approach course.

OUTER MARKER/OM— A marker beacon at or near the glide slope intercept altitude of an ILS approach. It is keyed to transmit two dashes per second on a 400 Hz tone which is received aurally and visually by compatible airborne equipment. The OM is normally located four to seven miles from the runway threshold on the extended centerline of the runway. (See Marker Beacon, Instrument Landing System) (Refer to AIM)

OVER— My transmission is ended; I expect a response.

OVERHEAD APPROACH/360 OVERHEAD— A series of predetermined maneuvers prescribed for VFR arrival of military aircraft (often in formation) for entry into the VFR traffic pattern and to proceed to a landing. The pattern usually specifies the following:

1. The radio contact required of the pilot.
2. The speed to be maintained.
3. An initial approach 3 to 5 miles in length.
4. An elliptical pattern consisting of two 180 degree turns.
5. A break point at which the first 180 degree turn is started.
6. The direction of turns.
7. Altitude (at least 500 feet above the conventional pattern).
8. A "Roll-out" on final approach not less than 1/4 mile from the landing threshold and not less than 300 feet above the ground.

PAN— The international radio-telephony urgency signal. When repeated three times indicates uncertainty or alert, followed by nature of urgency. (See MAYDAY) (Refer to AIM)

PARALLEL ILS APPROACHES— ILS approaches to parallel runways by IFR aircraft which, when established inbound toward the airport on the adjacent localizer courses, are radar-separated by at least 2 miles. (See Simultaneous ILS Approaches).

PARALLEL OFFSET ROUTE— A parallel track to the left or right of the designated or established airway/route. Normally associated with Area Navigation (RNAV) operations. (See Area Navigation)

PARALLEL RUNWAYS— Two or more runways at the same airport whose centerlines are parallel. In addition to runway number, parallel runways are designated as L (left) and R (right) or, if three parallel runways exist, L (left), C (center), and R (right).

PERMANENT ECHO— Radar signals reflected from fixed objects on the earth's surface; e.g., buildings, towers, terrain. Permanent echoes are distinguished from "ground clutter' by being definable locations rather than large areas. Under certain conditions they may be used to check radar alignment.

PHOTO RECONNAISSANCE (PR)— Military activity that requires locating individual photo targets and navigating to the targets at a preplanned angle and altitude. The activity normally requires a lateral route width of 16NM and altitude range of 1,500 feet to 10,000 feet AGL.

PILOT BRIEFING/PRE-FLIGHT PILOT BRIEFING— A service provided by the FSS to assist pilots in flight planning. Briefing items may include weather information, NOTAMS, military activities, flow control information and other items as requested. (Refer to AIM)

PILOT IN COMMAND— The pilot responsible for the operation and safety of an aircraft during flight time. (Refer to FAR Part 91)

PILOTS AUTOMATIC TELEPHONE WEATHER ANSWERING SERVICE/PATWAS— A continuous telephone recording containing current and forecast weather information for pilots. (See Flight Service Station) (Refer to AIM)

PILOT'S DISCRETION— When used in conjunction with altitude assignments, means that ATC has offered the pilot the option of starting climb or descent whenever he wishes and conducting the climb or descent at any rate he wishes. He may temporarily level off at any intermediate altitude. However, once he has vacated an altitude he may not return to that altitude.

PILOT WEATHER REPORT/PIREP— A report of meteorological phenomena encountered by aircraft in flight. (Refer to AIM)

POSITION REPORT/PROGRESS REPORT— A report over a known location as transmitted by an aircraft to ATC. (Refer to AIM)

POSITION SYMBOL— A computer generated indication shown on a radar display to indicate the mode of tracking.

POSITIVE CONTROL— The separation of all air traffic, within designated airspace, by air traffic control. (See Positive Control Area)

POSITIVE CONTROL AREA/PCA— (See Controlled Airspace)

PRACTICE INSTRUMENT APPROACH— An instrument approach procedure conducted by a VFR or IFR aircraft for the purpose of pilot training or proficiency demonstrations.

PRECIPITATION— Any or all forms of water particles (rain, sleet, hail, or snow), that fall from the atmosphere and reach the surface.

PRECISION APPROACH PROCEDURE/PRECISION APPROACH— A standard instrument approach procedure in which an electronic glide slope is provided, e.g., ILS and PAR. (See Instrument Landing System, Precision Approach Radar)

PRECISION APPROACH RADAR/PAR— Radar equipment in some ATC facilities operated by the FAA, and/or the military services at joint-use civil/military locations and separate military installations, to detect and display azimuth, elevation, and range of aircraft on the final approach course to a runway. This equipment may be used to monitor certain nonradar approaches, but is primarily used to conduct a precision instrument approach (PAR) wherein the controller issues guidance instructions to the pilot based on the aircraft's position in relation to the final approach course (azimuth), the glide path (elevation), and the distance (range) from the touchdown point on the runway as displayed on the radar scope. (See Glide Path) (Refer to AIM)

The abbreviation "PAR" is also used to denote preferential arrival routes in ARTCC computers. (See Preferential Routes)

ICAO-PRECISION APPROACH RADAR/PAR—Primary radar equipment used to determine the position of an aircraft during final approach, in terms of lateral and vertical deviations relative to a nominal approach path, and in range relative to touchdown.

PREFERENTIAL ROUTES— Preferential routes (PDRs, PARs, and PDARs) are adapted in ARTCC computers to accomplish inter/intra-facility controller coordination and to assure that flight data is posted at the proper control positions. Locations having a need for these specific inbound and outbound routes normally publish such routes in local facility bulletins and their use by pilots minimizes flight plan route amendments. When the workload or traffic situation permits, controllers normally provide radar vectors or assign requested routes to minimize circuitous routing. Preferential routes are usually confined to one ARTCC's area and are referred to by the following names or acronyms:

1. Preferential Departure Route/PDR—A specific departure route from an airport or terminal area to an en route point where there is no further need for flow control. It may be included in a Standard Instrument Departure (SID) or a Preferred IFR Route.
2. Preferential Arrival Route/PAR—A specific arrival route from an appropriate en route point to an airport or terminal area. It may be included in a Standard Terminal Arrival Route (STAR) or a Preferred IFR Route. The abbreviation "PAR" is used primarily within the ARTCC and should not be confused with the abbreviation for Precision Approach Radar.
3. Preferential Departure and Arrival Route/PDAR—A route between two terminals which are within or immediately adjacent to one ARTCC's area. PDARs are not synonomous with Preferred IFR Routes but may be listed as such as they do accomplish essentially the same purpose. (See Preferred IFR Routes, NAS Stage A)

PREFERRED IFR ROUTES— Routes established between busier airports to increase system efficiency and capacity. They normally extend through one or more ARTCC areas and are designed to achieve balanced traffic flows among high density terminals. IFR clearances are issued on the basis of these routes except when severe weather avoidance procedures or other factors dictate otherwise. Preferred IFR Routes are listed in the Airport/Facility Directory. If a flight is planned to or from an area having such routes but the departure or arrival point is not listed in the Airport/Facility Directory, pilots may use that part of a Preferred IFR Route which is appropriate for the departure or arrival point that is listed. Preferred IFR Routes are correlated with SIDs and STARs and may be defined by airways, jet routes, direct routes between NAVAIDs, Waypoints, NAVAID radials/DME, or any combinations thereof. (See Standard Instrument Departure, Standard Terminal Arrival, Preferential Routes, Center's Area) (Refer to Airport/Facility Directory and Notices to Airmen Publication)

PREVAILING VISIBILITY— (See Visibility)

PROCEDURE TURN INBOUND— That point of a procedure turn maneuver where course reversal has been completed and an aircraft is established inbound on the intermediate approach segment or final approach course. A report of "procedure turn inbound" is normally used by ATC as a position report for separation purposes. (See Final Approach Course, Procedure Turn, Segments of an Instrument Approach Procedure)

PROCEDURE TURN/PT— The maneuver prescribed when it is necessary to reverse direction to establish an aircraft on the intermediate approach segment or final approach course. The outbound course, direction of turn, distance within which the turn must be completed, and minimum altitude are specified in the procedure. However, unless otherwise restricted, the point at which the turn may be commenced, and the type and rate of turn, are left to the discretion of the pilot.

ICAO—PROCEDURE TURN— A maneuver in which a turn is made away from a designated track followed by a turn in the opposite direction, both turns being executed so as to permit the aircraft to intercept and proceed along the reciprocal of the designated track.

PROFILE DESCENT— An uninterrupted descent (except where level flight is required for speed adjustment; e.g., 250 knots at 10,000 feet MSL) from cruising altitude/level to interception of a glide slope or to a minimum altitude specified for the initial or intermediate approach segment of a nonprecision instrument approach. The profile descent normally terminates at the approach gate or where the glide slope or other appropriate minimum altitude is intercepted.

PROGRAMMABLE INDICATOR DATA PROCESSOR/PIDP— The PIDP is a modification to the AN/TPX-42 interrogator system currently installed in fixed RAPCONs. The PIDP detects, tracks, and predicts secondary radar aircraft targets. These are displayed by means of computer-generated symbols and alphanumeric characters depicting flight identification, aircraft altitude, ground speed, and flight plan data. Although primary radar targets are not tracked, they are displayed coincident with the secondary radar targets as well as with the other symbols and alphanumerics. The system has the capability of interfacing with ARTCCs.

PROHIBITED AREA— (See Special Use Airspace).

ICAO—PROHIBITED AREA— An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited.

PROPOSED BOUNDARY CROSSING TIME/PBCT— Each center has a PBCT parameter for each internal airport. Proposed internal flight plans are transmitted to the adjacent center if the flight time along the proposed route from the departure airport to the center boundary is less than or equal to the value of PBCT or if airport adaptation specifies transmission regardless of PBCT.

PUBLISHED ROUTE— A route for which an IFR altitude has been established, and published, e.g., Federal Airways, Jet Routes, Area Navigation Routes, Specified Direct Routes.

QUADRANT— A quarter part of a circle, centered on a NAVAID, oriented clockwise from magnetic north as follows: NE quadrant 000-089, SE quadrant 090-179, SW quadrant 180-269, NW quadrant 270-359.

QUICK LOOK— A feature of NAS Stage A and ARTS which provides the controller the capability to display full data blocks of tracked aircraft from other control positions.

QUOTA FLOW CONTROL/QFLOW— A flow control procedure by which the Central Flow Control Function (CFCF) restricts traffic to the ARTC Center area having an impacted airport thereby avoiding sector/ area saturation. (See Air Traffic Control Systems Command Center) (Refer to Airport/Facility Directory)

RADAR/RADIO DETECTION AND RANGING— A device which, by measuring the time interval between transmission and reception of radio pulses and correlating the angular orientation of the radiated antenna beam or beams in azimuth and/or elevation, provides information on range, azimuth, and/or elevation of objects in the path of the transmitted pulses.

1. Primary Radar—A radar system in which a minute portion of a radio pulse transmitted from a site is reflected by an object and then received back at that site for processing and display at an air traffic control facility.
2. Secondary Radar/Radar Beacon/ATCRBS—A radar system in which the object to be detected is fitted with cooperative equipment in the form of a radio receiver/transmitter (transponder). Radar pulses transmitted from the searching transmitter/receiver (interrogator) site are received in the cooperative equipment and used to trigger a distinctive transmission from the transponder. This reply transmission rather than a reflected signal, is then received back at the transmitter/receiver site for processing and display at an air traffic control facility. (See Transponder, Interrogator) (Refer to AIM)

ICAO—RADAR— A radio detection device which provides information on range, azimuth, and/or elevation of objects.

1. Primary Radar—A radar system which uses reflected radio signals.
2. Secondary Radar—A radar system wherein a radio signal transmitted from a radar station initiates the transmission of a radio signal from another station.

RADAR ADVISORY— The provision of advice and information based on radar observations. (See Advisory Service)

RADAR APPROACH— An instrument approach procedure which utilizes Precision Approach Radar (PAR) or Airport Surveillance Radar (ASR) (See PAR Approach, Surveillance Approach, Airport Surveillance Radar, Precision Approach Radar, Instrument Approach Procedure) (Refer to AIM)

ICAO—RADAR APPROACH— An approach, executed by an aircraft, under the direction of a radar controller.

RADAR APPROACH CONTROL FACILITY— A terminal ATC facility that uses radar and nonradar capabilities to provide approach control services to aircraft arriving, departing, or transiting airspace controlled by the facility (see Approach Control Service). Provides radar ATC services to aircraft operating in the vicinity of one or more civil and/ or military airports in a terminal area. The facility may provide services of a ground controlled approach (GCA); i.e., ASR and PAR approaches. A radar approach control facility may be operated by FAA, USAF, US Army, USN, USMC, or jointly by FAA and a military service. Specific facility nomenclatures are used for administrative purposes only and are related to the physical location of the facility and the operating service generally as follows:

Army Radar Approach Control/ARAC (Army).

Radar Air Traffic Control Facility/ RATCF (Navy/FAA).

Radar Approach Control/RAPCON (Air Force/ FAA).

Terminal Radar Approach Control/TRACON (FAA).

Tower/Airport Traffic Control Tower/ATCT (FAA). (Only those towers delegated approach control authority.)

RADAR ARRIVAL— An arriving aircraft which is being vectored to the final approach course for an instrument approach or toward the airport for a visual approach. (See Radar Approach, Visual Approach)

RADAR BEACON— (See Radar)

RADAR CONTACT—

1. Used by ATC to inform an aircraft that it is identified on the radar display and radar flight following will be provided until radar identification is terminated. Radar service may also be provided within the limits of necessity and capability. When a pilot is informed of "radar contact" he automatically discontinues reporting over compulsory reporting points. (See Radar Flight Following, Radar Contact Lost, Radar Service, Radar Service Terminated). (Refer to AIM)
2. The term used to inform the controller that the aircraft is identified and approval is granted for the aircraft to enter the receiving controllers airspace.

ICAO—RADAR CONTACT— The situation which exists when the radar blip of a particular aircraft is seen and identified on a radar display.

RADAR CONTACT LOST— Used by ATC to inform a pilot that radar identification of his aircraft has been lost. The loss may be attributed to several things including the aircraft merging with weather or ground clutter, the aircraft flying below radar line of sight, the aircraft entering an area of poor radar return or a failure of the aircraft transponder or ground radar equipment. (See Clutter, Radar Contact)

RADAR ENVIRONMENT— An area in which radar service may be provided. (See Radar Contact, Radar Service, Additional Services, Traffic Advisories)

RADAR FLIGHT FOLLOWING— The observation of the progress of radar identified aircraft, whose primary navigation is being provided by the pilot, wherein the controller retains and correlates the aircraft identity with the appropriate target or target symbol displayed on the radar scope. (See Radar Contact, Radar Service) (Refer to AIM)

RADAR IDENTIFICATION— The process of ascertaining that an observed radar target is the radar return from a particular aircraft. (See Radar Contact, Radar Service)

ICAO—RADAR IDENTIFICATION—The process of correlating a particular radar blip with a specific aircraft.

RADAR IDENTIFIED AIRCRAFT— An aircraft, the position of which has been correlated with an observed target or symbol on the radar display. (See Radar Contract, Radar Contact Lost)

RADAR MONITORING— (See Radar Service)

RADAR NAVIGATIONAL GUIDANCE— (See Radar Service)

RADAR POINT OUT/POINT OUT— Used between controllers to indicate radar handoff action where the initiating controller plans to retain communications with an aircraft penetrating the other controller's airspace and additional coordination is required.

RADAR ROUTE— A flight path or route over which an aircraft is vectored. Navigational guidance and altitude assignments are provided by ATC. (See Flight Path, Route)

RADAR SEPARATION— (See Radar Service)

RADAR SERVICE— A term which encompasses one or more of the following services based on the use of radar which can be provided by a controller to a pilot of a radar identified aircraft.

1. Radar Separation.—Radar spacing of aircraft in accordance with established minima.

ICAO—RADAR SEPARATION— The separation used when aircraft position information is derived from radar sources.

2. Radar Navigational Guidance.—Vectoring aircraft to provide course guidance.
3. Radar Monitoring.—The radar flight following of aircraft, whose primary navigation is being performed by the pilot, to observe and note deviations from its authorized flight path, airway, or route. When being applied specifically to radar monitoring of instrument approaches, i.e., with precision approach radar (PAR) or radar monitoring of simultaneous ILS approaches, it includes advice and instructions whenever an aircraft nears or exceeds the prescribed PAR safety limit or simultaneous ILS no transgression zone. (See Additional Services, Traffic Advisories)

ICAO—RADAR MONITORING— The use of radar for the purpose of providing aircraft with information and advice relative to significant deviations from nominal flight path.

ICAO—RADAR SERVICE— Term used to indicate a service provided directly by means of radar.

RADAR SERVICE TERMINATED— Used by ATC to inform a pilot that he will no longer be provided any of the services that could be received while under radar contact. Radar service is automatically terminated, and the pilot is not advised in the following cases:

1. An aircraft cancels its IFR flight plan, except within a TCA, TRSA, or where Stage II service is provided.
2. At the completion of a radar approach.
3. When an arriving VFR aircraft receiving radar services is advised to contact the tower.
4. When an aircraft conducting a visual approach or contact approach is advised to contact the tower.
5. When an aircraft making an instrument approach has landed or the tower has the aircraft in sight, whichever occurs first.

RADAR SURVEILLANCE— The radar observation of a given geographical area for the purpose of performing some radar function.

RADAR TRAFFIC ADVISORIES— (See Traffic Advisories)

RADAR TRAFFIC INFORMATION SERVICE— (See Traffic Advisories)

RADAR WEATHER ECHO INTENSITY LEVELS— Existing radar systems cannot detect turbulence. However, there is a direct correlation between the degree of turbulence and other weather features associated with thunderstorms and the radar weather echo intensity. The National Weather Service has categorized six (6) levels of radar weather echo intensity. The following list gives the weather features likely to be associated with these levels during thunderstorm weather situations:

1. Level 1 (WEAK) and Level 2 (MODERATE). Light to moderate turbulence is possible with lightning.
2. Level 3 (STRONG). Severe turbulence possible, lightning.
3. Level 4 (VERY STRONG). Severe turbulence likely, lightning.
4. Level 5 (INTENSE). Severe turbulence, lightning, organized wind gusts. Hail likely.

5. Level 6 (EXTREME). Severe turbulence, large hail, lightning, extensive wind gusts, and turbulence.

RADIAL— A magnetic bearing extending from a VOR/VORTAC/TACAN navigation facility.

RADIO—

1. A device used for communication.
2. Used to refer to a flight service station; e.g., "Seattle Radio" is used to call Seattle FSS.

RADIO ALTIMETER/RADAR ALTIMETER— Aircraft equipment which makes use of the reflection of radio waves from the ground to determine the height of the aircraft above the surface.

RADIO BEACON— (See Nondirectional Beacon)

RADIO MAGNETIC INDICATOR/RMI— An aircraft navigational instrument coupled with a gyro compass or similar compass that indicates the direction of a selected NAVAID and indicates bearing with respect to the heading of the aircraft.

RAMP— (See Apron)

READ BACK— Repeat my message back to me.

RECEIVING CONTROLLER/FACILITY— A controller/facility receiving control of an aircraft from another controller/facility.

REDUCE SPEED TO (SPEED)— (See Speed Adjustment)

RELEASE TIME— A departure time restriction issued to a pilot by ATC when necessary to separate a departing aircraft from other traffic.

*ICAO—RELEASE TIME—*Time prior to which an aircraft should be given further clearance or prior to which it should not proceed in case of radio failure.

REMOTE COMMUNICATIONS AIR/GROUND FACILITY/RCAG— An unmanned VHF/UHF transmitter/receiver facility which is used to expand ARTCC air/ground communications coverage and to facilitate direct contact between pilots and controllers. RCAG facilities are sometimes not equipped with emergency frequencies 121.5 MHz and 243.0 MHz. (Refer to AIM)

REMOTE COMMUNICATIONS OUTLET/RCO AND REMOTE TRANSMITTER/RECEIVER/RTR— An unmanned communications facility remotely controlled by air traffic personnel. RCO's serve FSS's. RTR's serve terminal ATC facilities. An RCO or RTR may be UHF or VHF and will extend the communication range of the air traffic facility. There are several classes of RCO's and RTR's. The class is determined by the number of transmitters or receivers. Classes A through G are used primarily for air/ground purposes. RCO and RTR class O facilities are nonprotected outlets subject to undetected and prolonged outages. RCO (O)'s and RTR (O)'s were established for the express purpose of providing ground-to-ground communications between air traffic control specialists and pilots located at a satellite airport for delivering en route clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/landing times. As a secondary function, they may be used for advisory purposes whenever the aircraft is below the coverage of the primary air/ground frequency.

REMOTE TRANSMITTER/RECEIVER/RTR— (See Remote Communications Outlet)

REPORT— Used to instruct pilots to advise ATC of specified information; e.g., "Report passing Hamilton VOR."

REPORTING POINT— A geographical location in relation to which the position of an aircraft is reported. (See Compulsory Reporting Point) (Refer to AIM)

ICAO—REPORTING POINT— A specified geographical location in relation to which the position of an aircraft can be reported.

REQUEST FULL ROUTE CLEARANCE/FRC— Used by pilots to request that the entire route of flight be read verbatim in an ATC clearance. Such request should be made to preclude receiving an ATC clearance based on the original filed flight plan when a filed IFR flight plan has been revised by the pilot, company, or operations prior to departure.

RESCUE COORDINATION CENTER/RCC— A search and rescue (SAR) facility equipped and manned to coordinate and control SAR operations in an area designated by the SAR plan. The U.S. Coast Guard and the U.S. Air Force have responsibility for the operation of RCC's.

ICAO—RESCUE CO-ORDINATION CENTRE— A unit responsible for promoting efficient organization of search and rescue service and for co-ordinating the conduct of search and rescue region.

RESTRICTED AREA— (See Special Use Airspace).

*ICAO—RESTRICTED AREA—*Airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions.

RESUME OWN NAVIGATION— Used by ATC to advise a pilot to resume his own navigational responsibility. It is issued after completion of a radar vector or when radar contact is lost while the aircraft is being radar vectored. (See Radar Contact Lost, Radar Service Terminated)

RNAV— (See Area Navigation)

RNAV APPROACH— An instrument approach procedure which relies on aircraft area navigation equipment for navigational guidance. (See Instrument Approach Procedure, Area Navigation)

ROAD RECONNAISSANCE (RC)— Military activity requiring navigation along roads, railroads and rivers. Reconnaissance route/route segments are seldom along a straight line and normally require a lateral route width of 10NM to 30NM and altitude range of 500 feet to 10,000 feet AGL.

ROGER— I have received all of your last transmission. It should not be used to answer a question requiring a yes or no answer. (See Affirmative, Negative)

ROLLOUT RVR— (See Visibility)

ROUTE— A defined path, consisting of one or more courses in a horizontal plane, which aircraft traverse over the surface of the earth. (See Airway, Jet Route, Published Route, Unpublished Route)

ROUTE SEGMENT— As used in Air Traffic Control, a part of a route that can be defined by two navigational fixes, two NAVAIDs, or a fix and a NAVAID. (See Fix, Route

ICAO—ROUTE SEGMENT—A portion of a route to be flown, as defined by two consecutive significant points specified in a flight plan.

RUNWAY— A defined rectangular area, on a land airport prepared for the landing and takeoff run of aircraft along its length. Runways are normally numbered in relation to their magnetic direction rounded off to the nearest 10 degrees. e.g., Runway 01, Runway 25. (See Parallel Runways)

ICAO—RUNWAY—A defined rectangular area, on a land aerodrome prepared for the landing and takeoff run of aircraft along its length.

RUNWAY CENTERLINE LIGHTING— (See Airport Lighting)

RUNWAY CONDITION READING/RCR— Numerical decelerometer readings relayed by air traffic controllers at USAF and certain civil bases for use by the pilot in determining runway braking action. These readings are routinely relayed only to USAF and Air National Guard Aircraft. (See Braking Action)

RUNWAY END IDENTIFIER LIGHTS— (See Airport Lighting) .

RUNWAY GRADIENT— The average slope, measured in percent, between two ends or points on a runway. Runway gradient is depicted on Government aerodrome sketches when total runway gradient exceeds 0.3%.

RUNWAY HEADING— The magnetic direction indicated by the runway number. When cleared to "fly/maintain runway heading," pilots are expected to comply with the ATC clearance by flying the heading indicated by the runway number without applying any drift correction; e.g., Runway 4, 040° magnetic heading; Runway 20, 200° magnetic heading.

RUNWAY IN USE/ACTIVE RUNWAY/DUTY RUNWAY— Any runway or runways currently being used for takeoff or landing. When multiple runways are used, they are all considered active runways.

RUNWAY LIGHTS— (See Airport Lighting)

RUNWAY MARKINGS— (See Airport Marking Aids.)

RUNWAY PROFILE DESCENT— An instrument flight rules (IFR) air traffic control arrival procedure to a runway published for pilot use in graphic and/or textual form and may be associated with a STAR. Runway Profile Descents provide routing, and may depict crossing altitudes, speed restrictions, and headings to be flown from the en route structure to the point where the pilot will receive clearance for and execute an instrument approach procedure. A Runway Profile Descent may apply to more than one runway if so stated on the chart. (Refer to AIM)

RUNWAY USE PROGRAM— A noise abatement runway selection plan designed to enhance noise abatement efforts with regard to airport communities for arriving and departing aircraft. These plans are developed into runway use programs and apply to all turbojet aircraft 12,500 pounds or heavier; turbojet aircraft less than 12,500 pounds are included only if the airport proprietor determines that the aircraft creates a noise problem. Runway use programs are coordinated with FAA offices, and safety criteria used in these programs are developed by the Office of Flight Operations. Runway use programs are administered by the Air Traffic Service as "Formal" or "Informal" programs.

1. Formal Runway Use Program—An approved noise abatement program which is defined and acknowledged in a Letter of Understanding between Flight Operations, Air Traffic Service, the airport proprietor, and the users. Once established, participation in the program is mandatory for aircraft operators and pilots as provided for in FAR:91.87.
2. Informal Runway Use Program—An approved noise abatement program which does not require a Letter of Understanding, and participation in the program is voluntary for aircraft operators/pilots.

RUNWAY VISIBILITY VALUE— (See Visibility)

RUNWAY VISUAL RANGE— (See Visibility)

SAFETY ADVISORY— A safety advisory issued by ATC to aircraft under their control if ATC is aware the aircraft is at an altitude which, in the controller's judgment, places the aircraft in unsafe proximity to terrain, obstructions, or other aircraft. The controller may discontinue the issuance of further advisories if the pilot advises he is taking action to correct the situation or has the other aircraft in sight.

1. Terrain/Obstruction Advisory—A safety advisory issued by ATC to aircraft under their control if ATC is aware the aircraft is at an altitude which, in the controller's judgment, places the aircraft in unsafe proximity to terrain/obstructions, e.g., "Low Altitude Alert, check your altitude immediately."
2. Aircraft Conflict Advisory—A safety advisory issued by ATC to aircraft under their control if ATC is aware of an aircraft that is not under their control at an altitude which, in the controller's judgment, places both aircraft in unsafe proximity to each other. With the alert, ATC will offer the pilot an alternate course of action when feasible, e.g., "Traffic Alert, advise you turn right heading zero niner zero or climb to eight thousand immediately."

The issuance of a safety advisory is contingent upon the capability of the controller to have an awareness of an unsafe condition. The course of action provided will be predicated on other traffic under ATC control. Once the advisory is issued, it is solely the pilot's prerogative to determine what course of action, if any, he will take.

SAIL BACK— A maneuver during high wind conditions (usually with power off) where float plane movement is controlled by water rudders/opening and closing cabin doors.

SAY AGAIN— Used to request a repeat of the last transmission. Usually specifies transmission or portion thereof not understood or received, e.g., "Say again all after ABRAM VOR."

SAY ALTITUDE— Used by ATC to ascertain an aircraft's specific altitude/flight level. When the aircraft is climbing or descending, the pilot should state the indicated altitude rounded to the nearest 100 feet.

SAY HEADING— Used by ATC to request an aircraft heading. The pilot should state the actual heading of the aircraft.

SEA LANE— A designated portion of water outlined by visual surface markers for and intended to be used by aircraft designed to operate on water.

SEARCH AND RESCUE FACILITY— A facility responsible for maintaining and operating a search and rescue (SAR) service to render aid to persons and property in distress. It is any SAR unit, station, NET or other operational activity which can be usefully employed during an SAR Mission, e.g., a Civil Air Patrol Wing or a Coast Guard Station. (See Search and Rescue)

SEARCH AND RESCUE/SAR— A service which seeks missing aircraft and assists those found to be in need of assistance. It is a cooperative effort using the facilities and services of available Federal, state and local agencies. The U.S. Coast Guard is responsible for coordination of search and rescue for the Maritime Region and the U.S. Air Force is responsible for search and rescue for the Inland Region. Information pertinent to search and rescue should be passed through any air traffic facility or be transmitted directly to the Rescue Coordination Center by telephone. (See Flight Service Station, Rescue Coordination Center) (Refer to AIM)

SEE AND AVOID— A visual procedure wherein pilots of aircraft flying in visual meteorological conditions (VMC), regardless of type of flight plan, are charged with the responsibility to observe the presence of other aircraft and to maneuver their aircraft as required to avoid the other aircraft. Right-of-way rules are contained in FAR, Part 91. (See Instrument Flight Rules, Visual Flight Rules, Visual Meteorological Conditions, Instrument Meteorological Conditions)

SEGMENTED CIRCLE— A system of visual indicators designed to provide traffic pattern information at airports without operating control towers. (Refer to AIM)

SEGMENTS OF AN INSTRUMENT APPROACH PROCEDURE— An instrument approach procedure may have as many as four separate segments depending on how the approach procedure is structured.

1. Initial Approach—The segment between the initial approach fix and the intermediate fix or the point where the aircraft is established on the intermediate course or final approach course.
2. Intermediate Approach—The segment between the intermediate fix or point and the final approach fix.
3. Final Approach—The segment between the final approach fix or point and the runway, airport, or missed approach point.
4. Missed Approach—The segment between the missed approach point, or point of arrival at decision height, and the missed approach fix at the prescribed altitude. (Refer to FAR Part 97)

ICAO

1. *Initial Approach*—That part of an instrument approach procedure consisting of the first approach to the first navigational facility associated with the procedure, or to a predetermined fix.
2. *Intermediate Approach*—That part of an instrument approach procedure from the first arrival at the first navigational facility or predetermined fix, to the beginning of the final approach.
3. *Final Approach*—That part of an instrument approach procedure from the time the aircraft has:
   - a. Completed the last procedure turn or base turn where one is specified, or
   - b. Crossed a specified fix, or
   - c. Intercepted the last track specified for the procedures until it has crossed a point in the vicinity of an aerodrome from which:
   - (1) A landing can be made, or
   - (2) A missed approach procedure is initiated.
4. *Missed Approach Procedure*—The procedure to be followed if, after an instrument approach, a landing is not effected and occurring normally:
   - a. When the aircraft has descended to the decision height and has not established visual contact, or
   - b. When directed by air traffic control to pull up or to go around again.

SEPARATION— In air traffic control, the spacing of aircraft to achieve their safe and orderly movement in flight and while landing and taking off. (See Separation Minima)

*ICAO—SEPARATION—*Spacing between aircraft, levels or tracks.

SEPARATION MINIMA— The minimum longitudinal, lateral, or vertical distances by which aircraft are spaced through the application of air traffic control procedures. (See Separation)

SEVERE WEATHER AVOIDANCE PLAN/SWAP— An approved plan to minimize the affect of severe weather on traffic flows in impacted terminal and/or ARTCC areas. SWAP is normally implemented to provide the least disruption to the ATC system when flight through portions of airspace is difficult or impossible due to severe weather.

SHORT RANGE CLEARANCE— A clearance issued to a departing IFR flight which authorizes IFR flight to a specific fix short of the destination while air traffic control facilities are coordinating and obtaining the complete clearance.

SHORT TAKEOFF AND LANDING AIRCRAFT/ STOL AIRCRAFT— An aircraft which, at some weight within its approved operating weight, is capable of operating from a STOL runway in compliance with the applicable STOL characteristics, airworthiness, operations, noise, and pollution standards. (See Vertical Takeoff and Landing Aircraft)

SIDESTEP MANEUVER— A visual maneuver accomplished by a pilot at the completion of an instrument approach to permit a straight-in landing on a parallel runway not more than 1200 feet to either side of the runway to which the instrument approach was conducted. (Refer to AIM)

SIGMET **/WS/SIGNIFICANT METEOROLOGICAL INFORMATION—** A weather advisory issued concerning weather significant to the safety of all aircraft. SIGMET advisories cover severe and extreme turbulence, severe icing, and widespread dust or sandstorms that reduce visibility to less than 3 miles. (See AIRMET and Convective SIGMET) (Refer to AIM).

ICAO—SIGMET INFORMATION— Information prepared by a meteorological watch office regarding the occurrence or expected occurrence of one or more of the following phenomena:

1. At subsonic cruising levels:

    Active thunderstorm area.
    Tropical revolving storm.
    Severe line squall.
    Heavy hail.
    Severe turbulence.
    Severe icing.
    Marked mountain waves.
    Widespread sandstorm/duststorm.

2. At transonic levels and supersonic cruising levels:

    Moderate or severe turbulence.
    Cumulonimbus clouds.
    Hail.

SIMPLIFIED DIRECTIONAL FACILITY/SDF— A NAVAID used for nonprecision instrument approaches. The final approach course is similar to that of an ILS localizer except that the SDF course may be offset from the runway, generally not more than 3 degrees, and the course may be wider than the localizer, resulting in a lower degree of accuracy. (Refer to AIM)

SIMULATED FLAMEOUT/SFO— A practice approach by a jet aircraft (normally military) at idle thrust to a runway. The approach may start at a relatively high altitude over a runway (high key) and may continue on a relatively high and wide downwind leg with a high rate of descent and a continuous turn to final. It terminates in a landing or low approach. The purpose of this approach is to simulate a flameout. (See Flameout)

SIMULTANEOUS ILS APPROACHES— An approach system permitting simultaneous ILS approaches to airports having parallel runways separated by at least 4,300 feet between centerlines. Integral parts of a total system are ILS, radar, communications, ATC procedures, and appropriate airborne equipment. (See Parallel Runways) (Refer to AIM)

SINGLE DIRECTION ROUTES— Preferred IFR Routes which are sometimes depicted on high altitude en route charts and which are normally flown in one direction only. (See Preferred IFR Route) (Refer to Airport/Facility Directory)

SINGLE FREQUENCY APPROACH/SFA— A service provided under a letter of agreement to military single-piloted turbojet aircraft which permits use of a single UHF frequency during approach for landing. Pilots will not normally be required to change frequency from the beginning of the approach to touchdown except that pilots conducting an en route descent are required to change frequency when control is transferred from the air route traffic control center to the terminal facility. The abbreviation "SFA" in the DOD FLIP IFR Supplement under "Communications" indicates this service is available at an aerodrome.

SINGLE-PILOTED AIRCRAFT— A military turbojet aircraft possessing one set of flight controls, tandem cockpits or two sets of flight controls but operated by one pilot is considered single-piloted by ATC when determining the appropriate air traffic service to be applied. (See Single Frequency Approach)

SLASH— A radar beacon reply displayed as an elongated target.

SLOW TAXI— To taxi a float plane at low power or low RPM.

SPEAK SLOWER— Used in verbal communications as a request to reduce speech rate.

SPECIAL EMERGENCY— A condition of air piracy, or other hostile act by a person(s) aboard an aircraft, which threatens the safety of the aircraft or its passengers.

SPECIAL INSTRUMENT APPROACH PROCEDURE— (See Instrument Approach Procedure)

SPECIAL USE AIRSPACE— Airspace of defined dimensions identified by an area on the surface of the earth wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. TYPES OF SPECIAL USE AIRSPACE:

1. Alert Area—Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft. Alert Areas are depicted on aeronautical charts for the information of nonparticipating pilots. All activities within an Alert Area are conducted in accordance with Federal Aviation Regulations and pilots of participating aircraft as well as pilots transiting the area are equally responsible for collision avoidance.

2. Controlled Firing Area—Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons and property on the ground.

3. Military Operations Area (MOA)—An MOA is an airspace assignment of defined vertical and lateral dimensions established outside positive control areas to separate/segregate certain military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. (Refer to AIM).
4. Prohibited Area—Designated airspace within which the flight of aircraft is prohibited. (Refer to En Route Charts, AIM).
5. Restricted Area—Airspace designated under FAR, Part 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use and IFR/VFR operations in the area may be authorized by the controlling ATC facility when it is not being utilized by the using agency. Restricted areas are depicted on en route charts. Where joint use is authorized, the name of the ATC controlling facility is also shown. (Refer to FAR, Part 73 and AIM)
6. Warning Area—Airspace which may contain hazards to nonparticipating aircraft in international airspace.

SPECIAL VFR CONDITIONS— Weather conditions in a control zone which are less than basic VFR and in which some aircraft are permitted flight under Visual Flight Rules. (See Special VFR Operations) (Refer to FAR Part 91)

SPECIAL VFR OPERATIONS— Aircraft operating in accordance with clearances within control zones in weather conditions less than the basic VFR weather minima. Such operations must be requested by the pilot and approved by ATC. (See Special VFR Conditions)

*ICAO—SPECIAL VFR FLIGHT—*A controlled VFR flight authorized by air traffic control to operate within a control zone under meteorological conditions below the visual meteorological conditions.

SPEED— (See Airspeed, Groundspeed)

SPEED ADJUSTMENT— An ATC procedure used to request pilots to adjust aircraft speed to a specific value for the purpose of providing desired spacing. Pilots are expected to maintain a speed of plus or minus 10 knots or 0.02 mach number of the specified speed.

Examples of speed adjustments are:

1. "Increase/reduce speed to mach point (number)."
2. "Increase/reduce speed to (speed in knots)" or "Increase/reduce speed (number of knots) knots."
3. "If practical, reduce speed to (speed);" or "If practical, reduce speed (number of) knots."

SPEED BRAKES/DIVE BRAKES— Moveable aerodynamic devices on aircraft that reduce airspeed during descent and landing.

SQUAWK (Mode, Code, Function)— Activate specific modes/codes/functions on the aircraft transponder, e.g., "Squawk three/alpha, two one zero five, low." (See Transponder)

STAGE I/II/III SERVICE— (See Terminal Radar Program)

STANDARD INSTRUMENT APPROACH PROCEDURE— (See Instrument Approach Procedure)

STANDARD INSTRUMENT DEPARTURE/SID— A preplanned instrument flight rule (IFR) air traffic control departure procedure printed for pilot use in graphic and/or textual form. SIDs provide transition from the terminal to the appropriate en route structure. (See IFR Takeoff Minima and Departure Procedures) (Refer to AIM)

STANDARD RATE TURN— A turn of three degrees per second.

STANDARD TERMINAL ARRIVAL/STAR— A preplanned instrument flight rule (IFR) air traffic control arrival procedure published for pilot use in graphic and/or textual form. STARs provide transition from the en route structure to an outer fix or an instrument approach fix/arrival waypoint in the terminal area.

STAND BY— Means the controller or pilot must pause for a few seconds, usually to attend to other duties of a higher priority. Also means to wait as in "stand by for clearance." If a delay is lengthy, the caller should reestablish contact.

STATIONARY RESERVATIONS— Altitude reservations which encompass activities in a fixed area. Stationary reservations may include activities such as special test of weapons systems or equipment, certain U.S. Navy carrier, fleet, and anti-submarine operations, rocket, missile and drone operations, and certain aerial refueling or similar operations.

STEPDOWN FIX— A fix permitting additional descent within a segment of an instrument approach procedure by identifying a point at which a controlling obstacle has been safely overflown.

STEP TAXI— To taxi a float plane at full power or high RPM.

STEP TURN— A maneuver used to put a float plane in a planing configuration prior to entering an active sea lane for takeoff. The STEP TURN maneuver should only be used upon pilot request.

STEREO ROUTE— A routinely used route of flight established by users and ARTCCs identified by a coded name, e.g., ALPHA 2. These routes minimize flight plan handling and communications.

STOP ALTITUDE SQUAWK— Used by ATC to inform an aircraft to turn-off the automatic altitude reporting feature of its transponder. It is issued when the verbally reported altitude varies 300 feet or more from the automatic altitude report. (See Altitude Readout, Transponder)

STOP AND GO— A procedure wherein an aircraft will land, make a complete stop on the runway, and then commence a takeoff from that point. (See Low Approach, Option Approach)

STOPOVER FLIGHT PLAN— A flight plan format which permits, in a single submission, the filing of a

READEX FICHE

sequence of flight plans through interim full-stop destinations to a final destination.

STOP SQUAWK (Mode or Code)— Used by ATC to tell the pilot to turn specified functions of the aircraft transponder off. (See Stop Altitude Squawk, Transponder)

STOP STREAM/BURST/BUZZER— Used by ATC to request a pilot to suspend electronic countermeasure activity. (See Jamming)

STOPWAY— An area beyond the takeoff runway designated by the airport authorities as able to support an airplane during an aborted takeoff. (Refer to FAR Part 1)

STRAIGHT-IN APPROACH—IFR— An instrument approach wherein final approach is begun without first having executed a procedure turn, not necessarily completed with a straight-in landing or made to straight-in landing minimums. (See Straight-in Landing, Landing Minimums, Straight-in Approach-VFR)

STRAIGHT-IN APPROACH—VFR— Entry into the traffic pattern by interception of the extended runway centerline (final approach course) without executing any other portion of the traffic pattern. (See Traffic Pattern)

STRAIGHT-IN LANDING— A landing made on a runway aligned within 30° of the final approach course following completion of an instrument approach. (See Straight-in Approach-IFR)

STRAIGHT-IN LANDING MINIMUMS/STRAIGHT-IN MINIMUMS— (See Landing Minimums)

SUBSTITUTE ROUTE— A route assigned to pilots when any part of an airway or route is unusable because of NAVAID status. These routes consist of:

1. Substitute routes which are shown on U.S. Government Charts.
2. Routes defined by ATC as specific NAVAID radials or courses.
3. Routes defined by ATC as direct to or between NAVAIDs.

SUNSET AND SUNRISE— The mean solar times of sunset and sunrise as published in the Nautical Almanac, converted to local standard time for the locality concerned. Within Alaska, the end of evening civil twilight and the beginning of morning civil twilight, as defined for each locality.

SURVEILLANCE APPROACH— An instrument approach wherein the air traffic controller issues instructions, for pilot compliance, based on aircraft position in relation to the final approach course (azimuth), and the distance (range) from the end of the runway as displayed on the controller's radar scope. The controller will provide recommended altitudes on final approach if requested by the pilot. (See PAR Approach) (Refer to AIM)

SYSTEM STRATEGIC NAVIGATION (SN)— Military activity accomplished by navigating along a preplanned route using internal aircraft systems to maintain a de- sired track. This activity normally requires a lateral route width of 10NM and altitude range of 1,000 feet to 6,000 feet AGL with some route segments that permit terrain following.

TACAN-ONLY AIRCRAFT— An aircraft, normally military, possessing TACAN with DME but no VOR navigational system capability. Clearances must specify TACAN or VORTAC fixes and approaches.

TACTICAL AIR NAVIGATION/TACAN— An ultrahigh frequency electronic rho-theta air navigation aid which provides suitably equipped aircraft a continuous indication of bearing and distance to the TACAN station. (See VORTAC) (Refer to AIM)

TARGET— The indication shown on a radar display resulting from a primary radar return or a radar beacon reply. (See Radar, Target Symbol)

ICAO—TARGET—In radar:

1. Generally, any discrete object which reflects or retransmits energy back to the radar equipment.
2. Specifically, an object of radar search or surveillance.

TARGET SYMBOL— A computer-generated indication shown on a radar display resulting from a primary radar return or a radar beacon reply.

TAXI— The movement of an airplane under its own power on the surface of an airport (FAR Part 135.100-Note). Also, it describes the surface movement of helicopters equipped with wheels. (See Air Taxi, Hover Taxi) (Refer to AIM)

TAXI INTO POSITION AND HOLD— Used by ATC to inform a pilot to taxi onto the departure runway in takeoff position and hold. It is not authorization for takeoff. It is used when takeoff clearance cannot immediately be issued because of traffic or other reasons (See HOLD, CLEARED FOR TAKEOFF).

TAXI PATTERNS— Patterns established to illustrate the desired flow of ground traffic for the different runways or airport areas available for use.

TERMINAL AREA— A general term used to describe airspace in which approach control service or airport traffic control service is provided.

TERMINAL AREA FACILITY— A facility providing air traffic control service for arriving and departing IFR, VFR, Special VFR, Special IFR aircraft and on occasion, en route aircraft. (See Approach Control, Tower)

TERMINAL CONTROL AREA— (See Controlled Airspace)

TERMINAL RADAR PROGRAM— A national program instituted to extend the terminal radar services, provided IFR aircraft, to VFR aircraft. Pilot participation in the program is urged but is not mandatory. The program is divided into two parts and referred to as Stage II and Stage III. The Stage service provided at a particular location is contained in the Airport/Facility Directory.

1. Stage I originally comprised two basic radar services (traffic advisories and limited vectoring to VFR aircraft). These services are provided by all

commissioned terminal radar facilities, but the term "Stage I" has been deleted from use.

2. Stage II/Radar Advisory and Sequencing for VFR Aircraft—Provides, in addition to the basic radar services, vectoring and sequencing on a full-time basis to arriving VFR aircraft. The purpose is to adjust the flow of arriving IFR and VFR aircraft into the traffic pattern in a safe and orderly manner and to provide traffic advisories to departing VFR aircraft.
3. Stage III/Radar Sequencing and Separation Service for VFR Aircraft—Provides, in addition to the basic radar services and Stage II, separation between all participating VFR aircraft. The purpose is to provide separation between all participating VFR aircraft and all IFR aircraft operating within the airspace defined as a Terminal Radar Service Area (TRSA) or Terminal Control Area (TCA). (See Controlled Airspace, Terminal Radar Service Area) (Refer to AIM, Airport/Facility Directory)

TERMINAL RADAR SERVICE AREA/TRSA— Airspace surrounding designated airports wherein ATC provides radar vectoring, sequencing and separation on a full-time basis for all IFR and participating VFR aircraft. Service provided in a TRSA is called Stage III Service. AIM contains an explanation of TRSA. TRSAs are depicted on VFR aeronautical charts. Pilot participation is urged but is not mandatory. (See Terminal Radar Program) (Refer to AIM, Airport/Facility Directory)

TERRAIN FOLLOWING/TF— The flight of a military aircraft maintaining a constant AGL altitude above the terrain or the highest obstruction. The altitude of the aircraft will constantly change with the varying terrain and/or obstruction.

TETRAHEDRON— A device normally located on uncontrolled airports and used as a landing direction indicator. The small end of a tetrahedron points in the direction of landing. At controlled airports, the tetrahedron, if installed, should be disregarded because tower instructions supersede the indicator. (See Segmented Circle) (Refer to AIM)

THAT IS CORRECT— The understanding you have is right.

THRESHOLD— The beginning of that portion of the runway usable for landing. (See Airport Lighting, Displaced Threshold)

THRESHOLD CROSSING HEIGHT/TCH— The theoretical height above the runway threshold at which the aircraft's glide slope antenna would be if the aircraft maintains the trajectory established by the mean ILS glidepath. (See Glide Slope, Threshold)

THRESHOLD LIGHTS— (See Airport Lighting)

TIME GROUP— Four digits representing the hour and minutes from the 24-hour clock. Time groups without time zone indicators are understood to be GMT (Greenwich Mean Time); e.g., "0205." A time zone designator is used to indicate local time; e.g., "0205M." The end and beginning of the day are shown by "2400" and "0000," respectively.

TORCHING— The burning of fuel at the end of an exhaust pipe or stack of a reciprocating aircraft engine, the result of an excessive richness in the fuel air mixture.

TOUCH-AND-GO/TOUCH-AND-GO LANDING— An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway.

TOUCHDOWN—

1. The point at which an aircraft first makes contact with the landing surface.
2. Concerning a precision radar approach (PAR), it is the point where the glide path intercepts the landing surface.

ICAO—TOUCHDOWN— The point where the nominal glide path intercepts the runway.

TOUCHDOWN RVR— (See Visibility)

TOUCHDOWN ZONE— The first 3,000 feet of the runway beginning at the threshold. The area is used for determination of Touchdown Zone Elevation in the development of straight-in landing minimums for instrument approaches.

TOUCHDOWN ZONE ELEVATION/TDZE— The highest elevation in the first 3,000 feet of the landing surface. TDZE is indicated on the instrument approach procedure chart when straight-in landing minimums are authorized. (See Touchdown Zone)

TOUCHDOWN ZONE LIGHTING— (See Airport Lighting)

TOWER/AIRPORT TRAFFIC CONTROL TOWER— A terminal facility that uses air/ground communications, visual signaling, and other devices to provide ATC services to aircraft operating in the vicinity of an airport or on the movement area. Authorizes aircraft to land or takeoff at the airport controlled by the tower or to transit the airport traffic area regardless of flight plan or weather conditions (IFR or VFR). A tower may also provide approach control services (radar or nonradar). (See Airport Traffic Area, Airport Traffic Control Service, Approach Control/Approach Control Facility, Approach Control Service, Movement Area, Tower En Route Control Service/Tower to Tower) (Refer to AIM)

ICAO—AERODROME CONTROL TOWER— A unit established to provide air traffc control service to aerodrome traffic.

TOWER EN ROUTE CONTROL SERVICE/TOWER TO TOWER— The control of IFR en route traffic within delegated airspace between two or more adjacent approach control facilities. This service is designed to expedite traffic and reduce control and pilot communication requirements.

TPX 42— A numeric beacon decoder equipment/system. It is designed to be added to terminal radar systems for beacon decoding. It provides rapid target identification, reinforcement of the primary radar target, and altitude information from Mode C. (See Automated Radar Terminal Systems, Transponder)

TRACK— The actual flight path of an aircraft over the surface of the earth. (See Course, Route, Flight Path)

*ICAO—TRACK—*The projection on the earth's surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from north (true, magnetic, or grid).

TRAFFIC—

1. A term used by a controller to transfer radar identification of an aircraft to another controller for the purpose of coordinating separation action. Traffic is normally issued (a) in response to a handoff or point out, (b) in anticipation of a handoff or point out, or (c) in conjunction with a request for control of an aircraft.
2. A term used by ATC to refer to one or more aircraft.

(Identification), TRAFFIC ALERT. ADVISE YOU TURN LEFT/RIGHT (specific heading if appropriate), AND/OR CLIMB/DESCEND (specific altitude if appropriate) IMMEDIATELY. (See Safety Advisory)

TRAFFIC ADVISORIES— Advisories issued to alert pilots to other known or observed air traffic which may be in such proximity to the position or intended route of flight of their aircraft to warrant his attention. Such advisories may be based on:

1. Visual observation.
2. Observation of radar identified and nonidentified aircraft targets on an ATC radar display, or
3. Verbal reports from pilots or other facilities.

The word "traffic" followed by additional information, if known, is used to provide such advisories; e.g., "Traffic, 2 o'clock, one zero miles, southbound, eight thousand."

Traffic advisory service will be provided to the extent possible depending on higher priority duties of the controller or other limitations, e.g., radar limitations, volume of traffic, frequency congestion or controller workload. Radar/nonradar traffic advisories do not relieve the pilot of his responsibility to see and avoid other aircraft. Pilots are cautioned that there are many times when the controller is not able to give traffic advisories concerning all traffic in the aircraft's proximity; in other words, when a pilot requests or is receiving traffic advisories, he should not assume that all traffic will be issued. (Refer to AIM, Radar Traffic Information Service)

TRAFFIC INFORMATION— (See Traffic Advisories)

TRAFFIC IN SIGHT— Used by pilots to inform a controller that previously issued traffic is in sight. (See Negative Contact, Traffic Advisories)

TRAFFIC NO LONGER A FACTOR— Indicates that the traffic described in a previously issued traffic advisory is no longer a factor.

TRAFFIC PATTERN— The traffic flow that is prescribed for aircraft landing at, taxiing on, or taking off from an airport. The components of a typical traffic pattern are upwind leg, crosswind leg, downwind leg, base leg and final approach.

1. Upwind Leg—A flight path parallel to the landing runway in the direction of landing.
2. Crosswind Leg—A flight path at right angles to the landing runway off its upwind end.
3. Downwind Leg—A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg.
4. Base Leg—A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline.
5. Final Approach—A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. An aircraft making a straight-in approach VFR is also considered to be on final approach.

(See Straight-In Approach-VFR, Taxi Patterns) (Refer to AIM, FAR Part 91)

ICAO—AERODROME TRAFFIC CIRCUIT— The specified path to be flown by aircraft operating in the vicinity of an aerodrome.

TRANSCRIBED WEATHER BROADCAST/TWEB— A continuous recording of meteorological and aeronautical information that is broadcast on L/MF and VOR facilities for pilots. (Refer to AIM)

TRANSFER OF CONTROL— That action whereby the responsibility for the separation of an aircraft is transferred from one controller to another.

ICAO—TRANSFER OF CONTROL— Transfer of responsibility for providing air traffic control service.

TRANSFERRING CONTROLLER/FACILITY— A controller/facility transferring control of an aircraft to another controller/facility.

ICAO—TRANSFERRING UNIT/CONTROLLER— Air Traffic Control Unit/Air Traffic Controller in the process of transferring the responsibility for providing air traffic control service to an aircraft to the next air traffic control unit/air traffic controller along the route of flight.

TRANSITION—

1. The general term that describes the change from one phase of flight or flight condition to another, e.g., transition from en route flight to the approach or transition from instrument flight to visual flight.
2. A published procedure (SID Transition) used to connect the basic SID to one of several en route airways/jet routes, or a published procedure (STAR Transition) used to connect one of several en route airways/jet routes to the basic STAR. (Refer to SID/STAR Charts)

TRANSITION AREA— (See Controlled Airspace)

TRANSMISSOMETER— An apparatus used to determine visibility by measuring the transmission of light through the atmosphere. It is the measurement source for determining runway visual range (RVR) and runway visibility value (RVV). (See Visibility)

TRANSMITTING IN THE BLIND/BLIND TRANSMISSION— A transmission from one station to other stations in circumstances where two-way communication cannot be established, but where it is believed that the called stations may be able to receive the transmission.

TRANSPONDER— The airborne radar beacon receiver/transmitter portion of the Air Traffic Control Radar Beacon System (ATCRBS) which automatically receives radio signals from interrogators on the ground, and selectively replies with a specific reply pulse or pulse group only to those interrogations being received on the mode to which it is set to respond. (See Interrogator) (Refer to AIM)

*ICAO—TRANSPONDER—*A receiver/transmitter which will generate a reply signal upon proper interrogation; the interrogation and reply being on different frequencies.

TURBOJET AIRCRAFT— An aircraft having a jet engine in which the energy of the jet operates a turbine which in turn operates the air compressor.

TURBOPROP AIRCRAFT— An aircraft having a jet engine in which the energy of the jet operates a turbine which drives the propeller.

T-VOR/TERMINAL-VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION— A very high frequency terminal omnirange station located on or near an airport and used as an approach aid. (See Navigational Aid, VOR)

TWO WAY RADIO COMMUNICATIONS FAILURE— (See Lost Communications)

ULTRAHIGH FREQUENCY/UHF— The frequency band between 300 and 3,000 MHz. The bank of radio frequencies used for military air/ground voice communications. In some instances this may go as low as 225 MHz and still be referred to as UHF.

ULTRALIGHT VEHICLE— An aeronautical vehicle operated for sport or recreational purposes which does not require FAA registration, an airworthiness certificate, nor pilot certification. They are primarily single occupant vehicles, although some two-place vehicles are authorized for training purposes. Operation of an ultralight vehicle in certain airspace requires authorization from ATC. (See FAR 103)

UNABLE— Indicates inability to comply with a specific instruction, request, or clearance.

UNCONTROLLED AIRSPACE— Uncontrolled airspace is that portion of the airspace that has not been designated as continental control area, control area, control zone, terminal control area, or transition area and within which ATC has neither the authority nor the responsibility for exercising control over air traffic. (See Controlled Airspace)

UNDER THE HOOD— Indicates that the pilot is using a hood to restrict visibility outside the cockpit while simulating instrument flight. An appropriately rated pilot is required in the other control seat while this operation is being conducted. (Refer to FAR Part 91)

UNICOM— A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOMs are shown on aeronautical charts and publications. (Refer to AIM, Airport/Facility Directory)

UNPUBLISHED ROUTE— A route for which no minimum altitude is published or charted for pilot use. It may include a direct route between NAVAIDS, a radial, a radar vector, or a final approach course beyond the segments of an instrument approach procedure. (See Published Route, Route)

UPWIND LEG— (See Traffic Pattern)

URGENCY— A condition of being concerned about safety, and of requiring timely but not immediate assistance; a potential Distress condition.

ICAO—URGENCY— A condition concerning the safety of an aircraft or other vehicle, or of person on board or in sight, but which does not require immediate assistance.

VECTOR— A heading issued to an aircraft to provide navigational guidance by radar.

ICAO—RADAR VECTORING— Provision of navigational guidance to aircraft in the form of specific headings, based on the use of radar.

VERIFY— Request confirmation of information; e.g., "verify assigned altitude."

VERIFY SPECIFIC DIRECTION OF TAKEOFF (OR TURNS AFTER TAKEOFF)— Used by ATC to ascertain an aircraft's direction of takeoff and/or direction of turn after takeoff. It is normally used for IFR departures from an airport not having a control tower. When direct communication with the pilot is not possible, the request and information may be relayed through an FSS, dispatcher, or by other means. (See IFR Takeoff Minimums and Departure Procedures)

VERTICAL SEPARATION— Separation established by assignment of different altitudes or flight levels. (See Separation)

*ICAO—VERTICAL SEPARATION—*Separation between aircraft expressed in units of vertical distance.

VERTICAL TAKEOFF AND LANDING AIRCRAFT/VTOL AIRCRAFT— Aircraft capable of vertical climbs and/or descents and of using very short runways or small areas for takeoff and landings. These aircraft include, but are not limited to, helicopters. (See Short Takeoff and Landing Aircraft)

VERY HIGH FREQUENCY/VHF— The frequency band between 30 and 300 MHz. Portions of this band, 108 to 118 MHz, are used for certain NAVAIDS; 118 to 136 MHz are used for civil air/ground voice communications. Other frequencies in this band are used for purposes not related to air traffic control.

VERY LOW FREQUENCY/VLF— The frequency band between 3 and 30 kHz.

VFR AIRCRAFT/VFR FLIGHT— An aircraft conducting flight in accordance with visual flight rules. (See Visual Flight Rules)

VFR CONDITIONS— Weather conditions equal to or better than the minimum for flight under visual flight rules. The term may be used as an ATC clearance/instruction only when:

1. An IFR aircraft requests a climb/descent in VFR conditions.
2. The clearance will result in noise abatement benefits where part of the IFR departure route does not conform to an FAA approved noise abatement route or altitude.
3. A pilot has requested a practice instrument approach and is not on an IFR flight plan.

All pilots receiving this authorization must comply with the VFR visibility and distance from cloud criteria in FAR Part 91. Use of the term does not relieve controllers of their responsibility to separate aircraft in TCAs/TRSAs as required by FAA Handbook 7110.65. When used as an ATC clearance/instruction, the term may be abbreviated "VFR;" e.g., "MAINTAIN VFR," "CLIMB/DESCEND VFR," etc.

VFR-ON-TOP— ATC authorization for an IFR aircraft to operate in VFR conditions at any appropriate VFR altitude (as specified in FAR and as restricted by ATC). A pilot receiving this authorization must comply with the VFR visibility, distance from cloud criteria, and the minimum IFR altitudes specified in FAR Part 91. The use of this term does not relieve controllers of their responsibility to separate aircraft in TCAs/TRSAs as required by FAA Handbook 7110.65.

VFR MILITARY TRAINING ROUTES (VR)— Routes used by the Department of Defense and associated Reserve and Air Guard units for the purpose of conducting low-altitude navigation and tactical training under VFR below 10,000 feet MSL at airspeeds in excess of 250 knots IAS.

VFR NOT RECOMMENDED— An advisory provided by a flight service station to a pilot during a preflight or inflight weather briefing that flight under visual flight rules is not recommended. To be given when the current and/or forecasted weather conditions are at or below VFR minimums. It does not abrogate the pilot's authority to make his own decision.

VIDEO MAP— An electronically displayed map on the radar display that may depict data such as airports, heliports, runway centerline extensions, hospital emergency landing areas, NAVAIDS and fixes, reporting points, airway/route centerlines, boundaries, handoff points, special use tracks, obstructions, prominent geographic features, map alignment indicators, range accuracy marks, minimum vectoring altitudes.

VISIBILITY— The ability, as determined by atmospheric conditions and expressed in units of distance, to see and identify prominent unlighted objects by day and prominent lighted objects by night. Visibility is reported as statute miles, hundreds of feet or meters. (Refer to FAR Part 91, AIM)

1. Flight Visibility—The average forward horizontal distance, from the cockpit of an aircraft in flight, at which prominent unlighted objects may be seen and identified by day and prominent lighted objects may be seen and identified by night.

ICAO—Flight Visibility—The visibility forward from the cockpit of an aircraft in flight.

2. Ground Visibility—Prevailing horizontal visibility near the earth's surface as reported by the United States National Weather Service or an accredited observer.

ICAO—Ground Visibility—The visibility at an aerodrome as reported by an accredited observer.

3. Prevailing Visibility—The greatest horizontal visibility equaled or exceeded throughout at least half the horizon circle which need not necessarily be continuous.
4. Runway Visibility Value/RVV—The visibility determined for a particular runway by a transmissometer. A meter provides a continuous indication of the visibility (reported in miles or fractions of miles) for the runway. RVV is used in lieu of prevailing visibility in determining minimums for a particular runway.
5. Runway Visual Range/RVR—An instrumentally derived value, based on standard calibrations, that represents the horizontal distance a pilot will see down the runway from the approach end. It is based on the sighting of either high intensity runway lights or on the visual contrast of other targets whichever yields the greater visual range. RVR, in contrast to prevailing or runway visibility, is based on what a pilot in a moving aircraft should see looking down the runway. RVR is horizontal visual range, not slant visual range. It is based on the measurement of a transmissometer made near the touchdown point of the instrument runway and is reported in hundreds of feet. RVR is used in lieu of RVV and/or prevailing visibility in determining minimums for a particular runway.
    a. Touchdown RVR—The RVR visibility readout values obtained from RVR equipment serving the runway touchdown zone.
    b. MID RVR—The RVR readout values obtained from RVR equipment located midfield of the runway.
    c. Rollout RVR—The RVR readout values obtained from RVR equipment located nearest the rollout end of the runway.

ICAO—Runway Visual Range—The maximum distance in the direction of takeoff or landing at which the runway or the specified lights or markers delineating it can be seen from a position above a specified point on its centerline at a height corresponding to the average eye-level of pilots at touchdown.

VISUAL APPROACH— An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

ICAO—VISUAL APPROACH—An approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed in visual reference to terrain.

VISUAL APPROACH SLOPE INDICATOR— (See Airport Lighting)

VISUAL DESCENT POINT/VDP— A defined point on the final approach course of a nonprecision straight-in approach procedure from which normal descent from the MDA to the runway touchdown point may be commenced, provided the approach threshold of that runway, or approach lights, or other markings identifiable with the approach end of that runway are clearly visible to the pilot.

VISUAL FLIGHT RULES/VFR—Rules that govern the procedures for conducting flight under visual conditions. The term "VFR" is also used in the United States to indicate weather conditions that are equal to kq created than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan. (See Instrument Flight Rules, Instrument Meteorological Conditions, Visual Meteorological Conditions) (Refer to FAR Part 91, AIM)

VISUAL HOLDING— The holding of aircraft at selected, prominent, geographical fixes which can be easily recognized from the air. (See Hold, Holding Fixes)

VISUAL METEOROLOGICAL CONDITIONS/VMC— Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima. (See Instrument Flight Rules, Instrument Meteorological Conditions, Visual Flight Rules)

VISUAL SEPARATION— A means employed by ATC to separate aircraft in terminal areas. There are two ways to effect this separation:

1. The tower controller sees the aircraft involved and issues instructions, as necessary, to ensure that the aircraft avoid each other.
2. A pilot sees the other aircraft involved and upon instructions from the controller provides his own separation by maneuvering his aircraft as necessary to avoid it. This may involve following another aircraft or keeping it in sight until it is no longer a factor. (See See and Avoid) (Refer to FAR Part 91)

VORTAC/VHF OMNIDIRECTIONAL RANGE/TACTICAL AIR NAVIGATION— A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance measuring equipment (DME) at one site. (See Distance Measuring Equipment, Navigational Aid TACAN, VOR) (Refer to AIM)

VORTICES/WING TIP VORTICES— Circular patterns of air created by the movement of an airfoil through the air when generating lift. As an airfoil moves through the atmosphere in sustained flight, an area of area of low pressure is created above it. The air flowing from the high pressure area to the low pressure area around and about the tips of the airfoil tends to roll up into two rapidly rotating vortices, cylindrical in shape. These vortices are the most predominant parts of aircraft wake turbulence and their rotational force is dependent upon the wing loading, gross weight, and speed of the generating aircraft. The vortices from medium to heavy aircraft can be of extremely high velocity and hazardous to smaller aircraft. (See Aircraft Classes Wake Turbulence) (Refer to AIM)

VOR/VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION— A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the National Airspace System. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature. Voice features may be used by ATC or FSS for transmitting instructions/information to pilots. (See Navigational Aid) (Refer to AIM)

VOT/VOR TEST SIGNAL— A ground facility which emits a test signal to check VOR receiver accuracy. Some VOT's are available to the user while airborne, and others are limited to ground use only. (Refer to FAR Part 91, AIM, Airport/Facility Directory)

WAKE TURBULENCE— Phenomena resulting from the passage of an aircraft through the atmosphere. The term includes vortices, thrust stream turbulence, jet blast, jet wash, propeller wash and rotor wash, both on the ground and in the air. (See Aircraft Classes, Jet Blast, Vortices) (Refer to AIM)

WARNING AREA— See Special Use Airspace.

WAYPOINT— (See Area Navigation)

WEATHER ADVISORY/INFLIGHT WEATHER ADVISORY— (See SIGMET, AIRMET)

WEATHER ADVISORY/WS/WST/WA/CWA— In aviation weather forecast practice, an expression of hazardous weather conditions not predicted in the area forecast, as they affect the operation of air traffic and as prepared by the NWS.

WHEN ABLE— When used in conjunction with ATC instructions, gives the pilot the latitude to delay compliance until a condition or event has been reconciled. Unlike "pilot discretion," when instructions are prefaced "when able," the pilot is expected to seek the first opportunity to comply. Once a maneuver has been initiated, the pilot is expected to continue until the specifications of the instructions have been met. "When able," should not be used when expeditious compliance is required.

WILCO— I have received your message, understand it, and will comply with it.

WIND SHEAR— A change in wind speed and/or wind direction in a short distance resulting in a tearing or shearing effect. It can exist in a horizontal or vertical direction and occasionally in both.

WORDS TWICE—

1. As a request: "Communication is difficult. Please say every phrase twice."

2. **As information: "Since communications are difficult, every phrase in this message will be spoken twice."**

[References are to Paragraph numbers]

A

ABANDONED APPROACH [7-78]
ABBREVIATED DEPARTURE CLEARANCE [4-17] [4-22]
Abbreviated IFR Flight Plans [Glossary]
ABBREVIATION [1-4] [1-24] [2-30]
Abeam [Glossary]
ABNORMAL AIRPORT CONDITIONS [4-70]
ABNORMALITIES [5-144]
Abort [Glossary]
ACCEPTING RADAR HANDOFF [5-65]
Acknowledge [Glossary]
ACKNOWLEDGMENT OF ATC TRANSMISSIONS [2-72]
Acrobatic Flight [Glossary]
ACTIVE RUNWAY USE [3-3] [3-4]
ADDITIONAL SEPARATION [5-74]
Additional Services [Glossary]
ADHERENCE TO CLEARANCE [4-45]
ADJACENT AIRSPACE [5-76]
ADJACENT FACILITY'S AIRSPACE [5-21]
ADJUSTMENT TERMINATION [5-104]
Administrator [Glossary]
ADVANCE APPROACH INFORMATION [4-65] [4-72]
Advise Intentions [Glossary]
Advisory Frequency [Glossary]
Advisory [Glossary]
ADVISORY INFORMATION [8-34]
Advisory Service [Glossary]
AERIAL REFUELING [5-25] [6-52] [8-29] [8-38]
Aerial Refueling/Inflight Refueling [Glossary]
AERIAL SAMPLING MISSIONS [2-4] [2-86] [8-36]
Aerodrome [Glossary]
Aeronautical Beacon [Glossary]
Aeronautical Chart [Glossary]
Affirmative [Glossary]
AFTERBURNER CLIMB [4-21]
AIR AMBULANCE [2-4]
AIR CARRIER AIRCRAFT [7-46]
Air Carrier District Office/ACDO [Glossary]
AIR DEFENSE EMERGENCY [8-12] [9-61]
Air Defense Emergency [Glossary]
AIR DEFENSE EXERCISE [5-31]
Air Defense Identification Zone/ADIZ [Glossary]
AIR EVACUATION AIRCRAFT [2-4]
Air Navigation Facility [Glossary]
Air Route Surveillance RADAR/ARSR [Glossary]
Air Route Traffic Control Center/ARTCC [Glossary]
AIR SAFETY [2-9] [2-73]
AIR TAXI [2-86] [2-87]
Air Taxi [Glossary]
Air Traffic Clearance/ATC Clearance [Glossary]
Air Traffic Control Command Center/ATCCC [Glossary]
Air Traffic Control Service [Glossary]
Air Traffic Control Specialist/Controller [Glossary]
Air Traffic Control/ATC [Glossary]
Air Traffic [Glossary]
AIRCRAFT APPROACH CATEGORIES [4-85]
AIRCRAFT APPROACH CATEGORY [5-152]
Aircraft Approach Category [Glossary]
AIRCRAFT BOMB THREATS [9-27]
AIRCRAFT CATEGORIES [3-106]
AIRCRAFT CATEGORY [3-122]
Aircraft Classes [Glossary]
AIRCRAFT DEPARTING SAME RUNWAY [5-113]
AIRCRAFT EMERGENCY [9-15]
AIRCRAFT EQUIPMENT MALFUNCTION [2-7]
Aircraft [Glossary]
AIRCRAFT IDENTIFICATION [2-35] [2-38] [2-52] [2-53] [2-56] [2-75] [2-76] [2-81] [2-82] [2-86] [3-4] [4-10] [4-66] [5-50] [5-60] [5-62] [7-73] [8-36]
AIRCRAFT IDENTIFICATON [4-71]
AIRCRAFT IN DISTRESS [9-4]
AIRCRAFT ON INITIAL CONTACT [7-71]
AIRCRAFT ORIENTATION [9-12]
AIRCRAFT POSITION PLOTS [9-20]
AIRCRAFT SEIZURE [9-22]
AIRCRAFT VECTOR [5-91]
Airman's Information Manual/AIM [Glossary]
AIRMET/Airman's Meteorological Information [Glossary]
Airport Advisory Area [Glossary]
Airport Advisory Service/AAS [Glossary]
AIRPORT CONDITION INFORMATION [3-32]
AIRPORT CONDITIONS [5-131]
Airport Elevation/Field Elevation [Glossary]
Airport [Glossary]
Airport Information Desk/AID [Glossary]
Airport Lighting [Glossary]
Airport Marking Aids [Glossary]
AIRPORT NOT SERVED BY TOWER [5-131]
AIRPORT RADAR SERVICE AREA [1-24] [7-100] [7-101] [7-102] [7-103] [7-104] [7-105] [7-106]
Airport Rotating Beacon [Glossary]
Airport Surface Detection Equipment/ASDE [Glossary]
Airport Surveillance RADAR/ASR [Glossary]
AIRPORT TRAFFIC AREA [2-16] [3-11] [3-47]
Airport Traffic Area [Glossary]
Airport Traffic Control Service [Glossary]
AIRPORT TRAFFIC CONTROL TOWER [2-85]
AIRPORT WITH WEATHER REPORTING [7-31]
AIRPORT WITHOUT WEATHER REPORTING [7-31]
Airport/Facility Directory [Glossary]
Airspeed [Glossary]
Airstart [Glossary]
AIRWAY [5-12]
Airway Beacon [Glossary]
Airway/Federal Airway [Glossary]
ALERT AREA [8-40] [10-2] [10-33]
Alert Notice/ALNOT [Glossary]
ALIGNMENT-CHECK [5-2]
ALNOT [9-3]
ALNOT (ALERT NOTICE) [9-18]

[*References are to Paragraph numbers*]

Alpha Numeric Display/Data Block [Glossary]
ALPHANUMERIC DATA [5-211]
ALS INTENSITY SETTINGS [3-44]
ALTERNATE AIRPORT [9-43]
Alternate Airport [Glossary]
ALTERNATIVE AIRWAY [2-90]
ALTERNATIVE CLEARANCE [1-20] [7-2] [7-20] [7-35]
ALTERNATIVE INSTRUCTIONS [5-143]
ALTIMETER [2-84] [2-111] [4-10] [4-42] [4-43] [4-72] [10-4]
ALTIMETER SETTING [2-84] [2-111] [4-10] [4-42] [4-43] [4-72] [5-37] [9-53] [10-4]
Altimeter Setting [Glossary]
ALTITUDE AND DISTANCE LIMITATIONS [4-2]
ALTITUDE ASSIGNMENT [4-10] [4-21] [4-40] [4-41] [4-42] [4-43] [4-44] [4-45] [4-46] [4-47] [4-80] [4-83] [4-90] [5-90] [5-123] [6-50] [7-43] [7-94] [7-104] [8-3] [8-29] [8-52] [10-5]
ALTITUDE CHANGE [2-35] [4-21] [4-46] [5-25] [8-3] [9-13]
ALTITUDE FILTERS [5-225]
ALTITUDE FOR DIRECTION OF FLIGHT [7-21]
Altitude [Glossary]
ALTITUDE INFORMATION [5-150]
Altitude Readout/Automatic Altitude Report [Glossary]
ALTITUDE RESERVATION [2-35] [4-16] [4-22]
Altitude Reservation/ALTRV [Glossary]
ALTITUDE RESTRICTED LOW APPROACH [3-131]
ALTITUDE RESTRICTION [2-53] [4-14] [4-21] [4-45]
Altitude Restriction [Glossary]
Altitude Restrictions Are Cancelled [Glossary]
ALTITUDE SEPARATION [6-51]
ALTITUDE VERIFICATION [4-47]
ALTRV [2-35] [2-37] [4-16] [4-22] [4-40] [5-25] [8-34] [8-37] [8-40]
AMBULANCE FLIGHTS [2-4] [2-86]
AMENDED CLEARANCE [4-14]
AMENDED FLIGHT PLAN [2-31]
ANTICIPATING SEPARATION [3-104] [3-127]
APPLICATION OF RADAR SERVICE TO VFR AIRCRAFT [7-60]
APPROACH CLEARANCE [2-52] [4-45] [4-51] [4-62] [4-63] [4-64] [4-67] [4-68] [4-70] [4-72] [4-80] [4-81] [4-82] [4-83] [4-84] [4-85] [4-86] [4-87] [4-88] [4-89] [4-90] [4-91] [5-123] [5-126] [6-61] [6-66] [10-16] [10-17]
Approach Clearance [Glossary]
Approach Control Facility [Glossary]
Approach Control Service [Glossary]
APPROACH GATE [5-120] [5-123]
Approach Gate [Glossary]
APPROACH GUIDANCE TERMINATION [5-155]
APPROACH INFORMATION [5-131]
APPROACH INTERVAL [7-95]
APPROACH LIGHTS [3-43]
APPROACH MONITORING [5-126] [5-180]
APPROACH SEPARATION RESPONSIBILITY [5-124]
APPROACH SEQUENCE [7-75]
Approach Sequence [Glossary]
Approach Speed [Glossary]
Apron/Ramp [Glossary]
AR TRACKS [8-29]
Arc [Glossary]
AREA NAVIGATION [6-34]
Area Navigation/RNAV [Glossary]
Army Aviation Flight Information Bulletin/USAFIB [Glossary]
ARRESTING SYSTEM ADVISORY [3-35]
Arresting System [Glossary]
ARRESTING SYSTEM OPERATION [3-35]
ARRIVAL INSTRUCTIONS [5-123]
Arrival Time [Glossary]
ARRIVING AIRCRAFT [3-106] [3-108]
ARRIVING AND DEPARTING AIRCRAFT [7-10]
ARSA [1-24] [7-100] [7-101] [7-102] [7-103] [7-104] [7-105] [7-106]
ARTS [4-71] [5-65] [7-77]
ARTS / PIDP IDENTIFICATION METHODS [5-53]
ARTS APPLICATION [5-210]
ARTS FACILITY [5-21]
ARTS FUNCTION [7-32]
ARTS RESPONSIBILITY [5-211]
ARTS TAGGING [5-212]
ARTS TRACKING [5-212]
ASDE / EQUIPMENT USAGE [3-70] [3-71]
ASDE TARGET IDENTIFICATION [3-72]
ASPEN AIRCRAFT [9-61]
ASSIGNMENT CRITERIA [5-20]
AT DECISION HEIGHT [5-165]
ATC Advises [Glossary]
ATC ASSIGNED AIRSPACE / ATCAA [8-40] [8-41] [8-42] [8-43]
ATC Assigned Airspace/ATCAA [Glossary]
ATC CLEARANCE [3-7] [4-21] [4-22] [4-45] [4-60] [9-54]
ATC Clears [Glossary]
ATC Instruction [Glossary]
ATC Requests [Glossary]
ATC SERVICES [1-1] [1-4] [1-9] [2-1] [2-2] [2-103] [4-11]
ATIS [2-70] [3-34] [3-120] [4-52] [4-64] [4-65] [4-70] [4-72] [8-83] [10-4] [5-126]
ATIS BROADCAST [7-3] [3-100]
AUTOMATED INTERFACILITY HANDOFF [5-65]
AUTOMATED RADAR TERMINAL SYSTEM [2-35] [5-210] [5-217]
Automated RADAR Terminal Systems/ARTS [Glossary]
AUTOMATED SYSTEMS [5-57]
AUTOMATIC ALTITUDE READOUTS [5-217]
AUTOMATIC ALTITUDE REPORTING [5-38] [5-52]
Automatic Altitude Reporting [Glossary]
Automatic Carrier Landing System/ACLS [Glossary]
Automatic Direction Finder/ADF [Glossary]
AUTOMATIC TERMINAL INFORMATION SERVICE [3-34]
Automatic Terminal Information Service/ATIS [Glossary]
AUTOMATION PROCEDURES [2-3]
Autorotation [Glossary]
Aviation Weather Service [Glossary]

B

BALLOON ADVISORY [8-70] [8-71]
BALLOONS [8-70] [8-71]
BASE LEG [9-54]
BEACON CODE COORDINATION [2-36]
BEACON CODES FOR PRESSURE SUIT FLIGHT [5-30]
BEACON CONTROL SLASH [5-71]
BEACON CONTROL SLASHES [5-73]
BEACON IDENTIFICATION METHODS [8-30] [5-52]
BEACON RANGE ACCURACY [5-4]
BEACON TARGET DISPLACEMENT [5-78]
BEACON TERMINATION [5-40]

Bearing [Glossary]
BEARINGS [9-51]
Below Minimums [Glossary]
BIRD ACTIVITY ADVISORY [2-22]
BIRDS [2-22]
Blast Fence [Glossary]
Blind Speed [Glossary]
Blind Spot/Blind Zone [Glossary]
BOARD MANAGEMENT [2-51]
BOMB THREATS [3-27]
BRAKING ACTION [2-102] [3-33] [3-34] [3-100]
Braking Action (Good, Fair, Poor, Nil) [Glossary]
BRAKING ACTION ADVISORIES [2-102] [3-34] [3-100] [3-120]
Braking Action Advisories [Glossary]
BRAKING ACTION REPORTS [3-33] [3-34]
BREAK POINT [3-133]
BRITE [5-62]
BRITE DISPLAY [7-77]
BROADBAND [5-2]
BROADBAND RADAR [5-26]
BROADCAST [2-101] [4-64] [4-70] [4-72] [4-73] [8-54] [8-71] [8-83] [10-4] [10-51]
Broadcast [Glossary]
BURST [5-5]

C

CALL SIGNS [2-76] [8-2] [8-31] [2-4] [2-54] [2-56] [2-74] [2-75] [2-81] [2-82] [2-86]
Call Up [Glossary]
CALM WIND RUNWAY [3-60]
CANADIAN AIRSPACE [2-42] [10-1] [10-2] [10-3] [10-4] [10-5] [10-6] [10-7] [10-8] [10-10] [10-11] [10-12] [10-13] [10-14] [10-15] [10-16] [10-17] [10-18] [10-31] [10-32] [10-33] [10-34] [10-35] [10-36] [10-50] [10-51]
CANADIAN BORDER CROSSING [10-6]
CANCEL IFR [5-29]
CANCEL TAKEOFF CLEARANCE [3-110]
CARDINAL ALTITUDES [7-21]
Cardinal Altitudes or Flight Levels [Glossary]
CATEGORY I II III IFR AIRCRAFT [7-92]
CEILING AND VISIBILITY [5-131]
Ceiling [Glossary]
Celestial Navigation [Glossary]
CENTER B [2-39]
Center Weather Advisory [Glossary]
Center's Area [Glossary]
CENTERLINES [5-125]
CHAFF [1-4] [2-103]
CHAFF DISPENSING [5-5]
Chaff [Glossary]
CHANGEOVER POINT [7-77]
Charted Visual Flight Procedure (CVFP) Approach [Glossary]
CHARTED VISUAL FLIGHT PROCEDURES [7-34]
Chase/Chase Aircraft [Glossary]
Circle To Land Maneuver/Circling Maneuver [Glossary]
Circle To Runway (Runway Numbered) [Glossary]
CIRCLING APPROACH [4-80] [4-85] [5-152]
CIRCLING MINIMUMS [2-105] [4-64] [4-67] [4-72] [5-131] [5-152] [6-60]
CLEAR AIR TURBULENCE [2-102]
Clear Air Turbulence/CAT [Glossary]
CLEARANCE DELAY [2-58] [4-50] [4-51]
CLEARANCE DELIVERY [4-12] [7-96]
Clearance [Glossary]
CLEARANCE ITEMS [4-10] [4-45]
CLEARANCE LIMIT [4-53] [9-14]
Clearance Limit [Glossary]
CLEARANCE LIMITS [2-35] [2-53] [2-58] [4-10] [4-21] [4-45] [4-50] [4-51] [4-60] [4-66] [4-69] [4-72] [4-81] [8-35] [10-6]
CLEARANCE PREFIX [4-11]
CLEARANCE RELAY [4-13] [4-21] [9-27] [4-11]
CLEARANCE RESTRICTION [4-23] [9-14]
CLEARANCE THROUGH CONTROL ZONE [7-47]
CLEARANCE TO CLIMB / DESCEND [5-70]
Clearance Void If Not Off By (Time) [Glossary]
CLEARANCE VOID TIME [4-23] [9-14]
CLEARED AS FILED [2-59] [4-22]
Cleared As Filed [Glossary]
Cleared For (Type Of) Approach [Glossary]
Cleared For Approach [Glossary]
Cleared For Takeoff [Glossary]
CLEARED FOR THE OPTION APPROACH [10-1]
Cleared For The Option [Glossary]
Cleared Through [Glossary]
Cleared To Land [Glossary]
Clearway [Glossary]
Climb To VFR [Glossary]
CLIMB TO VFR UPON REQUEST [7-45]
Climbout [Glossary]
Closed Runway [Glossary]
CLOSED RUNWAY INFORMATION [3-31]
CLOSED TRAFFIC [3-132]
Closed Traffic [Glossary]
Clutter [Glossary]
COAST TRACKS [5-196]
Coastal Fix [Glossary]
CODE CHANGES [8-29]
CODE MONITOR [5-33]
CODE 7500 [9-22]
CODE 7600 [5-28]
CODE 7700 [5-27]
Codes/Transponder Codes [Glossary]
Combined Center-RAPCON/CERAP [Glossary]
Common Route/Common Portion [Glossary]
COMMUNICATION CIRCUITS [9-18]
COMMUNICATIONS CHECK [5-138]
COMMUNICATIONS FAILURE [9-43]
COMMUNICATIONS GUARD [2-72]
COMMUNICATIONS RELEASE [4-87]
COMMUNICATIONS TRANSFER [5-66] [5-167] [7-32]
COMPANY APPROACH [10-16]
COMPANY DESIGNATOR [2-54]
Compass Locator [Glossary]
Compass Rose [Glossary]
COMPOSITE FLIGHT PLAN [4-17]
Composite Flight Plan [Glossary]
Composite Route System [Glossary]
Composite Separation [Glossary]
COMPULSORY REPORTING POINTS [4-5] [4-32] [5-12] [9-14]
Compulsory Reporting Points [Glossary]
COMPUTER ENTRY OF ASSIGNED ALTITUDE [5-192]
CONFLICT ADVISORY [2-6]

CONFLICT ALERT [2-6] [5-190]
Conflict Alert [Glossary]
Conflict Resolution [Glossary]
CONFLICT SUPPRESS [5-190]
CONSOLAN [Glossary]
CONTACT APPROACH [2-59] [4-63] [4-80] [5-13] [7-35] [10-16]
Contact Approach [Glossary]
Contact [Glossary]
Conterminous U.S. [Glossary]
Continental United States [Glossary]
CONTINUOUS READOUT [5-37]
CONTROL JURISDICTION [2-14] [2-15] [2-16] [2-17]
Control Sector [Glossary]
Control Slash [Glossary]
CONTROL SYMBOLOGY [2-59]
CONTROL TRANSFER [1-20] [2-8] [2-15] [2-17] [2-23] [2-38] [2-52] [4-26] [4-47] [4-52] [4-63] [4-66] [4-69] [4-71] [5-25] [7-32] [7-77] [8-70]
CONTROL TRANSFER IDENTIFICATION [5-60]
CONTROL TRANSFER METHODS [5-62]
CONTROL ZONE [3-1] [4-21] [7-10] [8-82] [10-15]
CONTROLLED AIRSPACE [2-50] [4-1] [4-21] [4-44] [5-90] [10-2] [10-12]
Controlled Airspace [Glossary]
CONTROLLED FIRING AREA [8-40]
CONTROLLED VISUAL FLIGHT / CVFR [10-3]
CONTROLLER ACCEPTING RESTRICTIONS [5-63]
Controller [Glossary]
CONTROLLER INITIATED COAST TRACKS [5-197]
CONTROLLER RESPONSIBILITY [1-1] [2-6] [2-15] [2-20] [3-3] [3-12] [3-30] [3-60] [4-22] [4-71] [4-90] [5-60] [5-100] [8-70]
Convective SIGMET/Convective Significant Meteorological Information [Glossary]
Coordinates [Glossary]
COORDINATION [9-5]
Coordination Fix [Glossary]
COORDINATION PARAMETER [4-26]
Correction [Glossary]
Course [Glossary]
COURSE GUIDANCE [5-154]
Critical Engine [Glossary]
Cross (Fix) At (Altitude) [Glossary]
Cross (Fix) At Or Above (Altitude) [Glossary]
Cross (Fix) At Or Below (Altitude) [Glossary]
CROSSING ALTITUDE [4-3] [4-21] [4-45] [10-6]
Crosswind Component [Glossary]
Crosswind [Glossary]
CRUISE CLEARANCE [4-45] [6-52]
Cruise [Glossary]
Cruising Altitude/Level [Glossary]
CURRENT ATIS BROADCAST [5-131]
CUSTOMS NOTIFICATION [8-12]

D

DANGEROUS MATERIALS [8-20]
DARC [5-194]
DE [5-65]
DECISION HEIGHT [2-34] [5-165] [5-166]
DECISION HEIGHT NOTIFICATION [5-161]
Decision Height/DH [Glossary]
DECLARE EMERGENCY [9-15]
Decoder [Glossary]
Defense Visual Flight Rules/DVFR [Glossary]
DEGREE DISTANCE FIXES [4-30] [4-32]
DEGREE DIVERGENCE TABLES [6-41]
Delay Indefinite (Reason If Known) Expect Approach/Further Clearance (Time) [Glossary]
DEPARTING AIRCRAFT [3-105] [3-106] [3-108]
DEPARTMENT OF ENERGY [2-86] [8-22]
DEPARTURE AND ARRIVAL [5-114] [5-115]
DEPARTURE AT VFR MINIMA [7-10]
DEPARTURE CLEARANCE [4-21] [4-22] [4-24] [10-6]
DEPARTURE CONTROL [7-79] [7-96]
DEPARTURE CONTROL FREQUENCY [3-102]
Departure Control [Glossary]
DEPARTURE CONTROL INSTRUCTIONS [3-102]
DEPARTURE DELAY INFORMATION [3-101]
DEPARTURE DELAYS [4-25]
DEPARTURE INFORMATION [2-111] [3-100]
DEPARTURE MESSAGES [4-28]
DEPARTURE PROCEDURES [3-100] [3-103] [3-104] [3-105] [3-107] [4-10] [4-20] [4-21] [4-22] [4-23] [4-24] [4-25] [4-26] [4-27] [4-28]
DEPARTURE TIME CHANGE [2-35]
Departure Time [Glossary]
DERELICT BALLOONS [8-71]
DESCEND TO GLIDESLOPE [5-126]
DESCENT CLEARANCE [4-45] [4-61] [4-64] [4-70] [4-91] [5-25] [5-101]
DESCENT INSTRUCTION [5-162]
DESCENT INSTRUCTIONS [5-153]
DESCENT NOTIFICATION [5-152]
DESCENT ON FINAL [5-135]
DESCENT POINT [5-153]
DEVIATION [5-10]
Deviations [Glossary]
DF Approach Procedure [Glossary]
DF BEARING [9-52]
DF Fix [Glossary]
DF FIXING BY NET [9-51]
DF FIXING BY ONE FACILITY [9-52]
DF GUIDANCE [9-56]
DF Guidance/DF Steer [Glossary]
DF SERVICE TERMINATION [9-53]
DF SITE [9-54]
DIGITAL DISPLAYS [5-71]
Direct Altitude and Identity Readout/DAIR [Glossary]
Direct [Glossary]
DIRECT ROUTES [4-31] [4-32] [4-80] [6-43]
DIRECTION FINDER / DF SERVICES [9-3] [9-15] [9-50] [9-54] [9-55]
Direction Finder/DF/UDF/VDF/UVDF [Glossary]
DISABLED AIRCRAFT [3-30]
DISASTER AREA RELIEF OPERATIONS [9-6]
DISCONTINUE APPROACH GUIDANCE [5-155]
DISCREET BEACON CODE [5-20] [5-21]
DISCREET CODE [5-23]
DISCRETE BEACON CODE [5-210]
Discrete Code/Discrete Beacon Code [Glossary]
Discrete Frequency [Glossary]
Displaced Threshold [Glossary]
DISPLAYED DATA BLOCK [5-53]
DISSEMINATING WEATHER INFORMATION [2-106]

[*References are to Paragraph numbers*]

DISTANCE FROM RUNWAY [5-154]
DISTANCE FROM TOUCHDOWN [5-164]
DISTANCE MEASURING EQUIPMENT / DME [2-35] [2-57] [4-5] [4-53] [4-66] [5-91] [6-1] [6-10] [6-11] [6-31] [6-32] [6-33] [6-34] [6-41] [6-42] [10-10] [10-11] [10-13]
DISTANCE MEASURING EQUIPMENT /DME [4-45] [5-51]
Distance Measuring Equipment/DME [Glossary]
DISTRESS / URGENCY [9-1]
Distress [Glossary]
DME ARC SEPARATION [6-42]
DME ARCS [4-30]
DME Fix [Glossary]
DME Separation [Glossary]
DOD FLIP [Glossary]
DOWNWIND LANDINGS [3-145]
DOWNWIND LEG [3-6] [4-85] [5-135]
Drag Chute [Glossary]
DRAGNET [8-31]
DROP AREA [8-60]
DUTCH AIRCRAFT [9-61]

E

E-MSAW [5-191]
EARTS [5-193]
EDGE OF RADAR DISPLAY [5-70]
EDGE OF SCOPE [5-77]
EFC [7-41]
EFC (EXPECT FURTHER CLEARANCE) [9-40]
ELECTRONIC COUNTER MEASURES / ECM / ECCM [5-5] [8-37]
ELECTRONIC CURSOR [5-7]
ELEVATION FAILURE [5-168]
ELT [9-16]
ELT SIGNALS [9-26]
EMERGENCY AIRPORT RECOMMENDATION [9-29]
EMERGENCY CODE ASSIGNMENT [5-27]
EMERGENCY COMMUNICATIONS [9-1] [2-77] [2-78]
EMERGENCY DF APPROACH [9-54] [9-56]
EMERGENCY FREQUENCY [5-5] [9-11]
Emergency [Glossary]
EMERGENCY INTERCEPT AND ESCORT [9-15]
EMERGENCY LIGHTING [3-35]
EMERGENCY LOCATOR TRANSMITTER / ELT [1-4] [9-4] [9-15] [9-26]
Emergency Locator Transmitter/ELT [Glossary]
EMERGENCY MESSAGES [2-77]
EMERGENCY OBSTRUCTION VIDEO MAP [9-31]
EMERGENCY RADAR BEACON [9-15]
EMERGENCY RADIO TRANSMISSIONS [2-86] [9-54]
EMERGENCY VECTORING [9-31]
En Route Air Traffic Control Services [Glossary]
En Route Automated RADAR Tracking System/EARTS [Glossary]
En Route Descent [Glossary]
En Route Flight Advisory Service/Flight Watch [Glossary]
En Route Minimum Safe Altitude Warning/E-MSAW [Glossary]
EN ROUTE STAGE A [5-57]
ENROUTE DESCENT FORMULA [4-64]
ENTRY OF REPORTED ALTITUDE [5-193]
EOVM [9-31]
EQUIPMENT MALFUNCTIONS [2-7] [2-10] [5-37] [2-9]
EQUIPMENT ON RUNWAYS [3-5]
EQUIPMENT PRESENTATION [5-1]
EQUIPMENT QUALIFIERS [2-57]
ETA [9-14]
EXCEEDING SAFETY LIMITS [5-144]
Execute Missed Approach [Glossary]
Expect (Altitudes) At (Time) Or (Fix) [Glossary]
EXPECT CLEARANCE [4-46]
Expect Departure Clearance (Time)/EDCT [Glossary]
Expect Further Clearance (Time)/EFC [Glossary]
Expect Further Clearance Via (Airways, Routes, Or Fixes) [Glossary]
Expedite [Glossary]
EXPERIMENTAL AIRCRAFT [8-23]
EXPLOSIVE CARGO [9-62]
EXPLOSIVE DETECTION [9-28]

F

FAA ADMINISTRATOR [1-6] [1-9] [2-74]
FACILITY ADVISORY BOARD [1-6]
FACILITY IDENTIFICATION [2-85]
FAILURE TO DISPLAY ASSIGNED BEACON [5-34]
FAR EXAMPLE 2861A OPERATIONS [2-111]
Fast File [Glossary]
Feathered Propeller [Glossary]
Feeder Route [Glossary]
Ferry Flight [Glossary]
Filed [Glossary]
FINAL APPROACH [2-6] [2-59] [3-47] [4-64] [4-80] [5-6] [5-123] [5-133] [5-183] [6-20] [6-60] [6-61] [6-63] [10-13] [5-132]
Final Approach - IFR [Glossary]
FINAL APPROACH COURSE [4-89] [5-180]
Final Approach Course [Glossary]
FINAL APPROACH COURSE INTERCEPT [5-121]
Final Approach Fix/FAF [Glossary]
FINAL APPROACH GUIDANCE [5-137] [5-154]
Final Approach Point [Glossary]
FINAL CONTROLLER CHANGEOVER [5-137]
Final Controller [Glossary]
Final [Glossary]
FIX [5-12]
Fix [Glossary]
FIX-USE [4-5]
FIXED ALTITUDES [7-43]
Flag/Flag Alarm [Glossary]
Flameout [Glossary]
FLAT TRACKING [5-197]
FLIGHT CHECK [2-4] [2-54] [8-1] [8-2] [8-3]
FLIGHT CHECK AIRCRAFT [8-3]
Flight Check [Glossary]
FLIGHT DATA ENTRY PRINTOUT [2-53]
FLIGHT DIRECTION [4-40]
Flight Information Region/FIR [Glossary]
FLIGHT INSPECTION [8-1] [8-2]
Flight Inspection/Flight Check [Glossary]
Flight Level [Glossary]
Flight Line [Glossary]
FLIGHT NOTIFICATION MESSAGES [2-30]
Flight Path [Glossary]

[References are to Paragraph numbers]

FLIGHT PLAN [2-4] [2-30] [2-31] [2-32] [2-33] [2-34] [2-35] [2-36] [2-37] [2-38] [2-39] [2-40] [2-41] [2-42] [2-43] [2-52] [2-56] [2-77] [4-16] [4-22] [4-27] [4-32] [4-34] [4-62] [4-80] [4-90] [5-31] [8-10] [8-11] [8-12] [8-20] [8-22] [8-25] [8-26] [8-29] [8-30] [8-31] [8-33] [8-35] [10-6]
FLIGHT PLAN AIDED TRACKING [5-197]
FLIGHT PLAN CANCELLATION [2-4] [2-38] [2-52] [4-62] [4-80] [4-90] [5-13]
FLIGHT PLAN CHANGE [2-34]
FLIGHT PLAN COORDINATION [2-35]
Flight Plan [Glossary]
FLIGHT PLAN INFORMATION [3-121]
FLIGHT PLAN PROCESSING [2-30]
FLIGHT PLAN TRACK POSITION DIFFERENCE [5-197]
FLIGHT PLAN VERIFICATION [2-38]
FLIGHT PROGRESS STRIPS [2-30] [2-40] [2-50] [2-51] [2-52] [2-53] [3-4] [5-11] [5-64] [8-70]
Flight Recorder [Glossary]
FLIGHT SAFETY [2-9] [2-35] [2-102] [2-103] [5-126] [8-11] [9-27]
Flight Service Station/FSS [Glossary]
Flight Standards District Office/FSDO [Glossary]
Flight Test [Glossary]
FLIGHT VISIBILITY BELOW ONE MILE [7-47]
Flight Watch [Glossary]
FLIGHTS ABOVE FL 600 [5-30]
FLOW CONTROL [4-52] [8-10]
Flow Control [Glossary]
Fly Heading (Degrees) [Glossary]
FLYNET AIRCRAFT [2-4] [8-25]
FOREIGN AIR CARRIER [9-4]
FOREIGN MILITARY AIRCRAFT [2-86]
FOREIGN REGISTRY AIRCRAFT [2-86] [8-10] [8-11] [8-12]
FORMATION BREAKUP [8-35]
Formation Flight [Glossary]
FORMATION FLIGHTS [2-13] [5-74] [8-29] [8-31] [8-34]
40 KNOT RULE [10-10]
44 KNOT RULE [6-31]
FORWARDING APPROACH INFORMATION [3-121]
FORWARDING ARRIVAL INFORMATION [4-66] [4-71]
FORWARDING DEPARTURE INFORMATION [2-31] [2-32] [2-42]
FORWARDING FLIGHT INFORMATION [2-31] [2-32] [2-40] [2-42] [2-57] [8-10] [8-70]
FORWARDING FLIGHT PLANS [2-42]
FREE COAST [5-197]
FREQUENCY CHANGES [2-17] [4-10] [4-62] [4-63] [4-87] [5-123] [9-11] [9-25]
Fuel Advisory Departure/FAD [Glossary]
FUEL DUMPING [8-50] [8-54] [10-50] [10-51]
FUEL DUMPING ADVISORY [8-54]
Fuel Dumping [Glossary]
Fuel Siphoning/Fuel Venting [Glossary]
FULL ROUTE CLEARANCE [4-22]
FUNCTION CODE ASSIGNMENTS [5-25]
FUNCTIONAL USE [5-212]
FW / SVFR FLIGHTS [7-41]

G

GARDEN PLOT AIRCRAFT [2-4]
GATE HOLD PROCEDURES [3-101]
Gate Hold Procedures [Glossary]
General Aviation District Office/GADO [Glossary]
General Aviation [Glossary]
GIANT LANCE OPERATIONS [8-34]
Glide Path, (On/Above/Below) [Glossary]
Glide Slope Intercept Altitude [Glossary]
Glide Slope/GS [Glossary]
GLIDEPATH AND COURSE INFORMATION [5-166]
GLIDEPATH COURSE INFORMATION [5-163]
GLIDEPATH NOTIFICATION [5-160]
GLIDEPATH TREND INFORMATION [5-182]
Go Ahead [Glossary]
Go Around [Glossary]
GPA 102 / 103 CORRECTION FACTOR [5-79]
Ground Clutter [Glossary]
GROUND CONTROL [2-17] [2-70] [3-3] [7-96]
GROUND CONTROL COORDINATION [3-4]
GROUND CONTROL RESPONSIBILITY [3-12]
Ground Controlled Approach/GCA [Glossary]
GROUND EMERGENCIES [9-6]
GROUND MISSILE EMERGENCY [9-70] [9-72] [9-73]
GROUND MOVEMENT INFORMATION [3-81]
GROUND OPERATIONS [3-82]
Ground Speed [Glossary]
GROUND TAXI [3-140]
GROUND TRAFFIC MOVEMENT [3-80]
GROUND VISIBILITY [7-35]
GROUND VISIBILITY BELOW ONE MILE [7-46]
GROUP SUPPRESSION [5-190]
GUIDANCE TO EMERGENCY AIRPORT [9-30]

H

HANDBOOK CHANGE PROCEDURE [1-6]
HANDOFF [5-61]
Handoff [Glossary]
Have Numbers [Glossary]
HAZARDOUS AREA [8-32]
HEAVY [2-81]
Height Above Airport/HAA [Glossary]
Height Above Landing/HAL [Glossary]
Height Above Touchdown/HAT [Glossary]
HELICOPTER ARRIVAL SEPARATION [3-143]
HELICOPTER DEPARTURES [3-142]
HELICOPTER GROUND MOVEMENT [3-140]
HELICOPTER LANDING CLEARANCE [3-145]
HELICOPTER SEPARATIN STANDARDS [3-142]
HELICOPTER SEPARATION [3-106] [3-122]
HELICOPTER SEPARATION MINIMA [7-49]
HELICOPTER SEPARATION STANDARDS [7-48]
HELICOPTER SIGNALING PROCEDURES [3-22]
HELICOPTER SPECIAL VFR [7-48]
HELICOPTER TAKEOFF CLEARANCE [3-141]
HELICOPTER TAXI [3-140]
HELICOPTER TAXIING [3-140] [3-142]
HELICOPTER TRAFFIC [7-93]
HELICOPTER VFR FLIGHTS [7-46]
HELICOPTER VFR OPERATIONS [7-47] [7-49] [10-15]
Helicopter/Copter [Glossary]
HELICOPTERS [7-103]
Helipad [Glossary]
Heliport [Glossary]
Hertz/Hz [Glossary]

[References are to Paragraph numbers]

HIGH ALTITUDE INSTRUMENT APPROACH [4-5] [4-83] [5-100]
High Frequency Communications/HF Communications [Glossary]
High Frequency/HF [Glossary]
HIGH INTENSITY RUNWAY LIGHTS [3-48]
HIGH PERFORMANCE CLIMB [4-21]
High Speed Taxiway/Exit/Turnoff [Glossary]
HIGH SPEED TURNOFF LIGHTS [3-53]
HIJACK PROCEDURES [9-22]
HIJACKED AIRCRAFT [9-22]
HIRL [3-50]
HOLD SHORT INSTRUCTIONS [3-123]
Hold/Holding Procedure [Glossary]
HOLDING AIRCRAFT [4-68]
HOLDING ALTITUDE [5-25] [6-66] [4-3]
HOLDING FIX [2-51] [2-52] [4-50] [4-53] [4-54] [4-71] [4-80] [4-89]
Holding Fix [Glossary]
HOLDING INSTRUCTIONS [2-58] [3-7] [3-103] [4-10] [4-50] [4-51] [4-53] [4-60] [4-80]
HOLDING MINIMUMS [4-5] [4-50] [4-80] [6-66]
HOLDING PATTERN [5-9]
HOLDING SPEED [2-52] [4-50] [10-11]
Homing [Glossary]
Hover Check [Glossary]
HOVER TAXI [3-140]
Hover Taxi [Glossary]
How Do You Hear Me ? [Glossary]

I

I Say Again [Glossary]
ICAO DESIGNATORS [5-214]
IDENT [5-52]
Ident Feature [Glossary]
Ident [Glossary]
IDENTIFICATION STATUS [5-56]
IDENTIFYING TURNS [5-55]
If Feasible, Reduce Speed To (Speed) [Glossary]
If No Transmission Received For (Time) [Glossary]
IFR AIRCRAFT [5-25] [5-51] [9-3]
IFR Aircraft/IFR Flight [Glossary]
IFR ALTITUDES [4-40] [4-45] [4-80] [4-90] [5-90] [6-52]
IFR Conditions [Glossary]
IFR DEPARTURE INFORMATION [7-79]
IFR FLIGHT LEVELS [4-14] [4-21] [4-22] [4-40] [4-41] [4-42] [4-43] [4-45] [4-47] [4-60] [4-64] [5-25] [6-63] [10-18] [10-31]
IFR FLIGHT PLAN [2-4] [2-38] [2-41] [3-121] [4-27] [4-62] [4-80] [5-13] [5-39] [7-2] [7-20] [9-24] [9-50]
IFR Military Training Routes (IR) [Glossary]
IFR OPERATIONS [5-39]
IFR OPERATIONS IN CONTROLLED AIRSPACE [2-50] [4-21] [4-44] [5-90] [10-2] [10-12]
IFR OPERATIONS IN UNCONTROLLED AIRSPACE [4-34] [5-90]
IFR SEPARATION STANDARDS [4-80] [4-90] [8-26] [8-29] [8-30] [8-36] [8-41] [8-42] [8-43] [10-16]
IFR Takeoff Minimums And Departure Procedures [Glossary]
IFR WEATHER CONDITIONS [5-133]
ILS APPROACH [2-59] [4-64] [4-80] [5-13] [5-125] [5-126]
ILS Categories [Glossary]
ILS CRITICAL AREA [3-84]
Immediately [Glossary]
IMPROVED RECEPTION [9-13]
IN-FLIGHT DEVIATION [5-39]
IN-FLIGHT EMERGENCY [9-10]
INDEFINITE ALERT SUPPRESSION [5-191]
INFORMATION DISPLAYED [5-214] [5-224]
INFORMATION FORWARDED TO ARTCC [9-16]
Information Request/INREQ [Glossary]
INHIBITING LOW ALTITUDE ALERT [5-226]
INHIBITING MSAW [5-216]
INITIAL APPROACH [3-133]
INITIAL APPROACH ALTITUDE [4-89]
Initial Approach Fix/IAF [Glossary]
Initial Approach Segment [Glossary]
INITIAL CONTACT [2-86] [2-111] [4-47] [4-62] [5-37] [5-138] [7-72] [8-30] [9-11]
INITIAL HEADING [5-111]
INITIATING A VECTOR [5-91]
INITIATING CONTROLLER [5-65]
Inner Marker/IM/Inner Marker Beacon [Glossary]
INOPERATIVE / MALFUNCTIONING INTERROGATOR [5-35]
INOPERATIVE / MALFUNCTIONING TRANSPONDER [5-34]
INOPERATIVE TOWER [7-80]
INREQ [9-3]
INREQ (INFORMATION REQUESTS) [9-18]
Instrument Approach Procedure/IAP/Instrument Approach [Glossary]
Instrument Flight Rules/IFR [Glossary]
INSTRUMENT LANDING SYSTEM / ILS [2-7] [2-120] [3-31] [3-84] [4-1] [4-57] [4-64] [4-72] [4-73] [4-80] [5-13] [5-125] [5-180] [6-61]
INSTRUMENT LANDING SYSTEM /ILS [2-59]
Instrument Landing System/ILS [Glossary]
Instrument Meteorological Conditions/IMC [Glossary]
Instrument Runway [Glossary]
INTERCEPTION ANGLE [5-121]
INTERCHANGE AIRCRAFT [2-54] [2-87]
INTERIM ALTITUDES [4-21] [5-192]
Intermediate Approach Segment [Glossary]
Intermediate Fix/IF [Glossary]
International Airport [Glossary]
International Civil Aviation Organization/ICAO [Glossary].
International Flight Information Manual/IFIM [Glossary]
INTERNATIONAL FLIGHT PLANS [2-42]
INTERPHONE COMMUNICATIONS [2-39] [2-53] [2-59] [2-70] [2-71] [2-73] [2-74] [2-77] [2-78] [2-80] [2-81] [2-82] [2-83] [2-86] [2-87] [5-125] [8-10]
INTERPHONE MESSAGE FORMAT [2-79]
Interrogator [Glossary]
INTERSECTING CONVERGING PARALLEL RUNWAYS [7-33]
INTERSECTING RUNWAY SEPARATION [3-108] [3-123]
Intersecting Runways [Glossary]
INTERSECTION DEPARTURE SEPARATION [3-107]
Intersection Departure/Intersection Takeoff [Glossary]
Intersection [Glossary]
INTERSECTION TAKEOFF (DEPARTURE) [3-4] [3-107] [5-113]

[References are to Paragraph numbers]

INTRAFACILITY TRANSFER [5-60]
IR ROUTES [8-26]
IR TAXI [2-54]
ISSUANCE OF EFC [7-91]
ISSUE CLEARANCE [5-143]
ISSUE SURFACE WIND [3-126]

J

Jamming [Glossary]
Jet Blast [Glossary]
Jet Route [Glossary]
JET ROUTES [2-90] [4-30] [4-31] [4-32] [4-44]
Jet Stream [Glossary]
Jettisoning Of External Stores [Glossary]

K

K-9 TEAMS [9-28]
Known Traffic [Glossary]

L

LAAS PROCESSING [5-226]
LANDING AREA CONDITION [3-30]
Landing Area [Glossary]
LANDING CHECK [5-135]
LANDING CLEARANCE [1-4] [3-31] [3-126] [3-127] [3-128]
Landing Direction Indicator [Glossary]
LANDING INFORMATION [3-120]
Landing Minimums/IFR Landing Minimums [Glossary]
Landing Roll [Glossary]
LANDING SEQUENCE [3-127] [4-68] [7-70] [7-75] [7-80]
Landing Sequence [Glossary]
Last Assigned Altitude [Glossary]
Lateral Separation [Glossary]
LAW ENFORCEMENT [8-28]
LETTERS OF AGREEMENT [1-8] [2-1] [2-11] [2-12] [2-16] [2-17] [2-38] [3-2] [3-20] [4-22] [4-28] [4-41] [4-62] [4-66] [4-71] [8-23] [8-26] [8-35] [8-41] [10-12]
LIFEGUARD [2-54]
Light Gun [Glossary]
LIGHT SIGNALS [3-20]
Lighted Airport [Glossary]
LIGHTING REQUIREMENTS [9-41]
LIMITATIONS [5-103]
LOCAL [7-75]
LOCAL CONTROL [2-17] [2-70] [2-101] [3-3] [5-123] [5-126]
LOCAL CONTROL COORDINATION [3-4]
LOCAL CONTROL FREQUENCY [7-77]
LOCAL CONTROL RESPONSIBILITY [3-12]
LOCAL CONTROLLER [7-72]
LOCAL EMERGENCY EQUIPMENT [9-6]
LOCAL OPERATIONS [7-44]
LOCAL PROCEDURES [7-49]
Local Traffic [Glossary]
LOCALIZER COURSE [5-126]
LOCALIZER CRITICAL AREA [3-84]
Localizer [Glossary]
Localizer Type Directional Aid/LDA [Glossary]
Localizer Usable Distance [Glossary]
Longitudinal Separation [Glossary]
LORAN/Long Range Navigation [Glossary]
LOST AIRCRAFT [5-51]
LOST COMMUNICATION PROCEDURES [8-26]
LOST COMMUNICATIONS [5-133] [10-6]
Lost Communications/Two-Way Radio Communications Failure [Glossary]
LOW ALTITITUDE ALERT [2-6] [5-226]
Low Altitude Airway Structure/Federal Airways [Glossary]
LOW APPROACH [3-103] [3-91] [3-131] [4-91]
LOW APPROACH AND TOUCH-AND-GO [5-142]
Low Approach [Glossary]
Low Frequency/LF [Glossary]
LOW LEVEL WIND SHEAR ALERT SYSTEM / LLWAS [3-8]
LOWER LIMITS [5-225]
LOWEST ASSIGNABLE ALTITUDE [4-5]

M

MACH NUMBER [2-84] [5-100] [5-101] [5-102]
Mach Number [Glossary]
MAGNETIC COURSES [7-21]
MAGNETIC HEADING [1-20] [5-91] [9-53]
Maintain [Glossary]
Make Short Approach [Glossary]
MALSR [3-50]
MANDATORY ALTITUDE [4-84]
Mandatory Altitude [Glossary]
MAP OVERLAY [5-7] [5-9]
Marker Beacon [Glossary]
MARSA [2-11] [8-26] [8-29] [8-35]
MAXIMUM ALTITUDE [4-44] [4-83] [4-84] [9-26]
Maximum Authorized Altitude/MAA [Glossary]
MAYDAY [9-1]
Mayday [Glossary]
MEA [9-27]
MEDIUM INTENSITY RUNWAY LIGHTS [3-51]
MERGING TARGET PROCEDURES [5-8]
MESSAGE ACKNOWLEDGMENT [2-72]
MESSAGE RELAY [2-74]
MESSAGE SUPPRESSING [5-215]
METEOROLOGICAL CONDITIONS [2-9]
Metering Fix [Glossary]
Metering [Glossary]
METHODS OF IDENTIFICATION [5-51]
Microwave Landing System/MLS [Glossary]
Middle Compass Locator [Glossary]
Middle Marker/MM [Glossary]
MILES FROM TOUCHDOWN [5-164]
MILITARY AIRCRAFT [1-8] [1-9] [2-4] [2-11] [2-21] [2-74] [2-86] [4-32] [4-41] [4-60] [4-63] [5-25] [5-40] [8-20] [8-25] [9-27] [10-14]
MILITARY AIRCRAFT ARRESTING SYSTEMS [3-35]
Military Authority Assumes Responsibility For Separation Of Aircraft/MARSA [Glossary]
MILITARY FLIGHT PLANS [2-41]
MILITARY OPERATIONS AREA / MOA [2-111] [8-40] [8-41] [8-42] [8-43]
MILITARY TRAINING ROUTES [8-26]
Military Training Routes/MTR [Glossary]
MINIMA [5-72] [5-102]
MINIMUM ALTITUDE [4-43] [4-44] [10-1]
Minimum Crossing Altitude/MCA [Glossary]

MINIMUM DESCENT ALTITUDE / MDA [2-6] [2-84] [4-85] [5-150] [5-152] [5-153] [6-60] [9-54]
Minimum Descent Altitude/MDA [Glossary]
Minimum En Route IFR Altitude/MEA [Glossary]
MINIMUM ENROUTE ALTITUDES / MEA [10-5]
MINIMUM FUEL [2-8]
MINIMUM FUEL ADVISORY [2-8]
Minimum Fuel [Glossary]
Minimum Holding Altitude/MHA [Glossary]
Minimum IFR Altitudes/MIA [Glossary]
Minimum Obstruction Clearance Altitude/MOCA [Glossary]
Minimum Reception Altitude/MRA [Glossary]
MINIMUM REQUIRED INFORMATION [9-10]
MINIMUM SAFE ALTITUDE / MSA [4-90] [5-191] [7-35] [7-94] [9-24] [9-50]
MINIMUM SAFE ALTITUDE WARNING / MSAW [5-191]
Minimum Safe Altitude Warning/MSAW [Glossary]
Minimum Safe Altitude/MSA [Glossary]
MINIMUM VECTORING ALTITUDE / MVA [4-63] [4-90] [5-90] [5-120] [5-123] [7-94] [9-31]
Minimum Vectoring Altitude/MVA [Glossary]
Minimums/Minima [Glossary]
MISSED APPROACH [2-59] [4-63] [4-71] [4-80] [4-88] [4-89] [4-90] [6-60] [6-61] [6-66] [5-144]
Missed Approach [Glossary]
MISSED APPROACH INSTRUCTIONS [5-144]
MISSED APPROACH POINT / MAP [5-155]
Missed Approach Point/MAP [Glossary]
MISSED APPROACH PROCEDURE [5-141]
MIXED ENVIRONMENT [5-23]
MOCA [9-27]
MODE C [5-224] [5-225]
MODE C REQUIREMENTS [5-39]
Mode [Glossary]
MODE 3 / A RADAR [5-3] [5-33]
MODIFY / QUICK LOOK FUNCTION [5-64]
MODIFY FUNCTION [5-62]
MONITOR AVAILABILITY [5-181]
MONITOR INFORMATION [5-182]
MONITOR ON PAR EQUIPMENT [5-180]
MOORED BALLOONS [8-71]
Movement Area [Glossary]
MOVEMENT AREAS [2-20] [3-4] [3-20] [3-32] [3-80] [3-81] [3-141]
MOVEMENT MESSAGES [2-77]
Moving Target Indicator/MTI [Glossary]
MRA [9-27]
MSAW PROCESSING [5-216]
MULTIPLE RUNWAY APPLICATION (VISUAL) [7-33]
MULTIPLE RUNWAY USE [3-60] [3-93]
MULTITARGET AREA [5-32]

N

NARROWBAND [5-2]
NARROWBAND RADAR [5-26]
NAS Stage A [Glossary]
NATIONAL AIRSPACE SYSTEM [5-53]
NATIONAL AIRSPACE SYSTEM / NAS [2-9] [2-43] [5-57] [5-194]
National Airspace System/NAS [Glossary]
National Beacon Code Allocation Plan Airspace/NBCAP Airspace [Glossary]
National Flight Data Center/NFDC [Glossary]
National Flight Data Digest/NFDD [Glossary]
National Search And Rescue Plan [Glossary]
NATIONAL TERMINAL RADAR PROGRAM [5-90]
NATIONAL WEATHER SERVICE / NWS [2-103]
NAVAID ALTITUDE AND DISTANCE LIMITATIONS [4-1] [4-2] [4-5]
NAVAID Classes [Glossary]
NAVAID LIMITS [4-1]
NAVAID MALFUNCTION [2-10]
NAVAID MONITORING [5-64]
NAVAID OR DME FIX [5-169]
NAVAID SERVICE VOLUME [4-4] [5-91]
NAVAID SHUTDOWN [2-10]
NAVAID STATUS [4-33]
Navigable Airspace [Glossary]
Navigational Aid/NAVAID [Glossary]
NAVY FLEET SUPPORT MISSIONS [1-4] [9-60]
NBCAP [5-21]
NBCAP AIRSPACE [5-25]
NEACP AIRCRAFT [2-4]
Negative Contact [Glossary]
Negative [Glossary]
Night [Glossary]
NIGHTWATCH FLIGHTS [2-4]
No Gyro Approach/Vector [Glossary]
NO TRANSGRESSION ZONE / NTZ [5-126]
NO-GYRO APPROACH [5-132]
NO-GYRO SURVEILLANCE [5-132]
NOISE ABATEMENT [5-90] [7-2]
NOISE COMPLAINTS [3-11]
NOISE SENSITIVE AREA [3-60]
NONAPPROACH CONTROL FACILITIES [3-121]
NONAPPROACH CONTROL TOWER [2-16] [7-10]
Noncomposite Separation [Glossary]
Nondirectional Beacon/Radio Beacon/NDB [Glossary]
NONDISCREET CODE [5-23]
NONDISCREET CODE ASSIGNMENT [5-25]
NONDISCREET ENVIRONMENT [5-22]
NONDISCREET FUNCTION CODE [5-22]
NONINTERSECTING DIVERGING RUNWAYS [5-115]
NONINTERSECTING RUNWAYS [5-113]
NONMOVEMENT AREAS [3-141] [3-145]
NONPARTICIPATING AIRCRAFT [7-70]
NONPRECISION APPROACH [5-120] [5-182]
Nonprecision Approach Procedure/Nonprecision Approach [Glossary]
NonRADAR Approach Control [Glossary]
NonRADAR [Glossary]
NONRADAR ROUTE [5-91]
NONRADAR SEPARATION [2-3]
North American Route [Glossary]
Notice To Airmen/NOTAM [Glossary]
NOTICES TO AIRMEN / NOTAM [2-9] [9-70] [9-74]
Notices To Airmen Publication [Glossary]
NOTICES TO AIRMEN/ NOTAM [5-6]
NUCLEAR CONTAMINATION ATMOSPHERIC SAMPLING [2-4] [8-36]
NUCLEAR RADIATION AREA [8-32]
NUMBERS USAGE [2-84]

[*References are to Paragraph numbers*]

Numerous Targets Vicinity (Location) [Glossary]

O

OBSTACLE CRITICAL AREA [3-84]
Obstacle [Glossary]
OBSTRUCTION ADVISORY [2-6]
OBSTRUCTION CLEARANCE [4-45] [4-80] [5-123] [9-31]
Obstruction [Glossary]
Obstruction Light [Glossary]
OBSTRUCTION LIGHTS [3-55]
OBTAINING INFORMATION [9-2]
Off-route Vector [Glossary]
Offset Parallel Runways [Glossary]
On Course [Glossary]
On-Course Indication [Glossary]
OPERATING INITIALS [2-80]
OPERATING WITHIN CONTROL ZONE [7-46]
OPERATIONS ABOVE FL600 [8-30]
OPPOSITE DIRECTION DISTANCE MINIMA [3-93]
OPPOSITE DIRECTION SEPARATION [6-32]
Option Approach [Glossary]
Organized Track System [Glossary]
OTHER PERTINENT INFORMATION [9-10]
Out [Glossary]
OUTBOUND LEG [9-54]
Outer Area [Glossary]
Outer Fix [Glossary]
Outer Marker/OM [Glossary]
Over [Glossary]
OVERDUE / LOST AIRCRAFT [9-5]
OVERDUE AIRCRAFT [4-71] [9-3] [9-14] [9-16] [9-17]
OVERDUE AIRCRAFT INFORMATION [3-121]
OVERHEAD APPROACH [3-133]
Overhead Approach/360 Overhead [Glossary]

P

PAN [Glossary]
PAR APPROACH [5-132] [5-135]
PAR APPROACHES [5-160]
PAR AZIMUTH [5-168]
PAR EQUIPMENT [5-180]
PAR FINAL APPROACH [5-133]
PAR INSTRUCTIONS [5-168]
PARACHUTE JUMP OPERATIONS [8-80] [8-81] [8-82] [8-83] [10-7]
PARALLEL ILS APPROACH [5-125]
PARALLEL ILS APPROACHES [5-125]
Parallel ILS Approaches [Glossary]
Parallel Offset Route [Glossary]
PARALLEL RUNWAYS [5-113] [5-115] [7-33]
Parallel Runways [Glossary]
PASSING FINAL APPROACH FIX [5-182]
PASSING FLIGHT DATA [2-40]
PASSING FLIGHT PLANS [2-35]
PASSING OR DIVERGING [5-73]
PATTERN ALTITUDE [2-133]
PCA [5-25]
Permanent Echo [Glossary]
PERSONNEL ON RUNWAYS [3-5]
PHONETIC ALPHABET [2-54] [2-83] [2-86]
Photo Reconnaissance/PR [Glossary]
PIDP [5-210]
PILOT ACKNOWLEDGEMENTS [2-72]
PILOT BRIEFING [4-70] [5-131]
Pilot Briefing/Pre-Flight Pilot Briefing [Glossary]
PILOT CLEARANCE RESPONSIBILITY [4-80]
PILOT NOT IFR QUALIFIED [9-25]
PILOT READBACK [2-72]
PILOT REQUESTS [2-21] [3-35] [4-5] [4-22] [4-50] [4-52] [4-53] [8-22] [9-2]
PILOT RESPONSIBILITIES [2-20] [4-80]
PILOT TRAFFIC ADVISORY PRACTICES [4-90]
PILOT WEATHER REPORT BROADCAST [3-34]
Pilot Weather Report/PIREP [Glossary]
Pilot-In-Command [Glossary]
PILOT/CONTROLLER GLOSSARY [1-4]
Pilot's Discretion [Glossary]
Pilots Automatic Telephone Weather Answering Service/PATWAS [Glossary]
PILOTS DISCRETION CLEARANCE [4-45]
PIREP [2-102] [3-34] [5-120]
POINT OUT [5-61]
POINT OUT APPROVED [5-61]
POINT-IN-SPACE APPROACH [5-151]
POINTOUT [5-66]
POSITION ADVISORIES [5-166]
POSITION DETERMINATION [9-55]
POSITION IN APPROACH SEQUENCE [7-73]
POSITION INFORMATION [5-55] [5-136]
POSITION OR IDENTIFICATION OF AIRCRAFT [5-144]
POSITION RELIEF BRIEFING [2-23]
Position Report/Progress Report [Glossary]
POSITION REPORTING [2-35] [5-12] [8-3]
POSITION REPORTS [4-5]
Position Symbol [Glossary]
POSITIVE CONTROL AREA [4-4] [7-1]
POSITIVE CONTROL AREA / PCA [5-3]
POSITIVE CONTROL AREA RESTRICTIONS [7-1]
Positive Control [Glossary]
POSITIVE RADAR CONTROL AREA IN PCA [5-36]
POSTED TIME UPDATE INTERVAL (PTUI) [5-197]
PRACTICE INSTRUMENT APPROACH [7-2]
Practice Instrument Approach [Glossary]
PRACTICE PRECAUTIONARY APPROACH [3-134]
PRECIPITATION [3-30] [5-114]
Precipitation [Glossary]
PRECISION APPROACH [5-120]
Precision Approach Procedure/Precision Approach [Glossary]
Precision Approach RADAR/PAR [Glossary]
PREFERENTIAL ROUTES [4-21] [4-60]
Preferential Routes [Glossary]
Preferred IFR Routes [Glossary]
PREPLANNING [2-50]
PRESIDENTIAL AIRCRAFT [2-4] [2-86] [5-8]
PRIMARY RADAR [5-3]
PRIMARY RADAR IDENTIFICATION [5-51]
PRIMARY RADAR TARGETS [5-71]
PRIOR COORDINATION [8-21]
PRIORITIES [2-2] [2-4] [2-6] [2-8] [2-77] [2-78] [2-86] [4-24] [4-90] [5-90] [5-101] [7-41] [8-3] [8-36]
PROCEDURAL CONSTRAINTS [1-9]
PROCEDURAL DEVIATIONS [1-9]

PROCEDURAL LETTERS [1-8] [2-1]
PROCEDURE RESTRICTION [5-91]
PROCEDURE TURN [2-59] [4-80] [4-89] [6-20] [9-54] [10-13]
Procedure Turn Inbound [Glossary]
Procedure Turn/PT [Glossary]
Profile Descent [Glossary]
Programmable Indicator Data Processor/PIDP [Glossary]
PROHIBITED / RESTRICTED / WARNING AREA [8-42] [8-43]
PROHIBITED AREA [8-41]
PROMINENT OBSTRUCTIONS [5-75]
Proposed Boundary Crossing Time/PBCT [Glossary]
PROTECTED AIRSPACE [6-43]
PROTECTED AIRSPACE AREA [5-10]
PROVIDING ASSISTANCE [9-3]
PROVIDING DF SERVICES [9-50]
PROXIMITY OF TARGETS [5-54]
PUBLISHED MDA [5-150]
Published Route [Glossary]
PVD [5-194]

Q

Quadrant [Glossary]
QUESTIONABLE IDENTIFICATION [5-54]
Quick Look [Glossary]
QUICK LOOL FUNCTIONS [5-62]
Quota Flow Control [Glossary]

R

RAC FLIGHTS [8-22]
RADAR [1-4] [2-6] [2-16] [2-19] [2-20] [2-21] [2-35] [2-38] [2-53] [2-57] [2-75] [2-84] [2-85] [2-103] [2-106] [3-1] [3-4] [3-6] [3-128] [4-26] [4-28] [4-32] [4-44] [4-63] [4-64] [4-66] [4-80] [4-88] [5-1] [5-31] [5-52] [6-60] [6-61] [6-64] [7-70] [7-92] [8-37] [9-71] [10-30] [10-31] [10-32] [10-33] [10-34] [10-35] [10-36]
RADAR ADVISORIES [5-29]
RADAR Advisory [Glossary]
RADAR ADVISORY SERVICE [2-16]
RADAR APPLICATION [4-26] [5-196] [5-50]
RADAR APPROACH [5-130]
RADAR Approach Control Facility [Glossary]
RADAR Approach [Glossary]
RADAR APPROACHES APPLICATION [5-130]
RADAR Arrival [Glossary]
RADAR ARRIVAL PROCEDURES [4-63]
RADAR ASSISTANCE [9-24]
RADAR ASSISTANCE TECHNIQUES [9-25]
RADAR BEACON [2-53] [2-84] [3-102] [4-63] [5-4] [5-21] [5-22] [5-25] [5-29] [5-31] [5-51] [5-78] [8-3] [9-43]
RADAR BEACON CODE ASSIGNMENT [5-20]
RADAR BEACON CODE CHANGES [5-24]
RADAR CONTACT [5-11] [5-12] [5-61]
RADAR Contact [Glossary]
RADAR CONTACT LOST [5-134] [5-144]
RADAR Contact Lost [Glossary]
RADAR DEPARTURE [4-28]
RADAR DEPARTURE PROCEDURES [5-110]
RADAR Environment [Glossary]
RADAR EQUIPMENT PERFORMANCE [5-1]
RADAR FINAL CONTROLLER [5-124]
RADAR FIX [2-53]
RADAR FIX POSTING [5-11]
RADAR Flight Following [Glossary]
RADAR HANDOFF [2-38] [4-26] [4-28] [4-56] [5-64] [5-65]
RADAR HANDOFFS [5-66]
RADAR IDENTIFICATION [5-50] [5-53] [5-55] [5-56] [5-57] [5-62] [5-64] [5-133] [8-30]
RADAR Identification [Glossary]
RADAR IDENTIFICATION WITHIN ONE MILE [5-113]
RADAR Identified Aircraft [Glossary]
RADAR MALFUNCTIONS [5-6]
RADAR MAPPING [5-6]
RADAR MONITOR [4-31]
RADAR MONITORING [4-2] [7-31]
RADAR MONITORING NOT AVAILABLE [5-181]
RADAR OUTAGE [7-71]
RADAR Point Out/Point Out [Glossary]
RADAR Route [Glossary]
RADAR SEPARATION [2-3] [5-125]
RADAR SEPARATION STANDARDS [10-31] [10-34]
RADAR Service [Glossary]
RADAR SERVICE LIMITATIONS [5-6]
RADAR Service Terminated [Glossary]
RADAR SERVICE TERMINATION [7-80]
RADAR SERVICE TO VFR AIRCRAFT [7-60]
RADAR SURVEILLANCE [5-9]
RADAR Surveillance [Glossary]
RADAR SYSTEM PERFORMANCE [5-70]
RADAR TARGETS [5-4]
RADAR TRACKING [5-194]
RADAR TRAFFIC ADVISORIES [7-79]
RADAR TRAFFIC ADVISORY [2-16] [3-6] [5-3] [7-97]
RADAR USE [5-3]
RADAR VECTOR [4-31]
RADAR VECTORS [1-4] [2-20] [2-21] [4-30] [4-31] [4-64] [4-88] [6-60]
RADAR WEATHER ECHO INTENSITY LEVELS [2-103]
RADAR Weather Echo Intensity Levels [Glossary]
RADAR/Radio Detection And Ranging [Glossary]
Radial [Glossary]
Radio Altimeter/RADAR Altimeter [Glossary]
RADIO BEACON [4-1]
RADIO FAILURE [5-28]
RADIO FAILURE PROCEDURES [9-54]
Radio [Glossary]
Radio Magnetic Indicator/RMI [Glossary]
RADIO MESSAGE FORMAT [2-75]
RCC (RESCUE COORDINATION CENTER) [9-17]
Read Back [Glossary]
RECEIVER ONLY AIRCRAFT [3-22]
RECEIVING CONTROLLER [5-66]
RECEIVING CONTROLLER HANDOFF [5-65]
Receiving Controller/Facility [Glossary]
RECEIVING CONTROLLERS APPROVAL [5-64]
RECOMMENDED ALTITUDES [5-150] [5-154]
REDUCED SEPARATION [1-8]
REFERENCE FIX [5-51]
REINSTATING ARTS [5-213]
Release Time [Glossary]
Remote Communications Air/Ground Facility/RCAG [Glossary]
Remote Communications Outlet/RCO [Glossary]

[References are to Paragraph numbers]

Remote Transmitter/Receiver/RTR [Glossary]
REPEATED ADVISORIES [5-182]
Report [Glossary]
REPORTED WEATHER CRITERIA [7-34]
Reporting Point [Glossary]
REPORTING POINTS [4-5] [4-32] [5-12] [5-51]
Request Full Route Clearance/FRC [Glossary]
RESCUE COORDINATION CENTER [9-26]
Rescue Coordination Center/RCC [Glossary]
RESEARCH AND DEVELOPMENT FLIGHTS [8-24]
RESPONSIBILITY TRANSFER TO RCC [9-19]
RESTRICTED / WARNING AREA [8-40] [8-41]
RESTRICTED AIRSPACE [10-33]
RESTRICTED AREA [5-33]
Resume Own Navigation [Glossary]
RIGHT OF WAY [2-4]
RING-AROUND [5-32]
RNAV [5-90]
RNAV AIRCRAFT [5-70]
RNAV Approach [Glossary]
RNAV SEPARATION [6-34] [6-44]
Road Reconnaisance/RC [Glossary]
ROGER [Glossary]
ROTATING BEACON [3-56]
ROUTE AMENDMENT [4-14]
ROUTE COURSE CHANGES [6-43]
ROUTE DESCRIPTIONS [2-90]
ROUTE DEVIATIONS [8-33]
Route [Glossary]
ROUTE OF FLIGHT [5-39]
Route Segment [Glossary]
ROUTE STRUCTURE CHANGES [4-31]
ROUTING VIA AN MTR [4-2]
RUNNING SCANNING [3-12]
RUNWAY / APPROACH LIGHTS [9-41]
RUNWAY CENTERLINE LIGHTS [3-48]
RUNWAY CONDITION READING [3-33]
Runway Condition Reading/RCR [Glossary]
RUNWAY CONDITIONS [3-30] [3-34]
RUNWAY CROSSING [3-6] [6-5]
RUNWAY EDGE LIGHTS [3-47] [3-52]
RUNWAY END IDENTIFIER LIGHTS [3-35]
RUNWAY EXITING [3-130]
Runway [Glossary]
Runway Gradient [Glossary]
RUNWAY HOLDING PROCEDURES [3-83]
Runway Markings [Glossary]
Runway Profile Descent [Glossary]
RUNWAY PROXIMITY [3-83]
RUNWAY SELECTION [3-61]
RUNWAY SEPARATION [7-33]
RUNWAY SURFACE CONDITIONS [3-33]
RUNWAY USE [2-122] [3-3] [3-34] [3-60] [3-93] [4-72] [4-85] [6-5] [7-77]
Runway Use Program [Glossary]
RUNWAY VISIBILITY [2-120]
RUNWAY VISIBILITY VALUE / RVV [2-120]
RUNWAY VISUAL RANGE / RVR [2-120]
Runway-In Use/Active Runway/Duty Runway [Glossary]

S

SAC EVASIVE ACTION MANEUVER [8-33]
SAC MITO OPERATIONS [8-35]
SAFE AIR [2-74]
SAFETY ADVISORY [2-2] [2-6]
Safety Advisory [Glossary]
SAFI [8-1] [8-2] [8-3]
SAFI FLIGHTS [2-4]
Sail Back [Glossary]
SAME DIRECTION DISTANCE MINIMA [3-92]
SAME RUNWAY SEPARATION [3-106] [3-122]
SAR [9-3]
SAR MISSIONS [2-4] [5-29]
SATELLITE AIRPORTS [7-96]
Say Again [Glossary]
Say Altitude [Glossary]
Say Heading [Glossary]
SCRATCH PAD [5-214]
SEA LANE ARRIVAL SEPARATION [3-152]
SEA LANE DEPARTURE SEPARATION [3-151]
Sea Lane [Glossary]
SEA LANE OPERATIONS [3-150]
SEARCH AND RESCUE AIRCRAFT [2-4]
Search And Rescue Facility [Glossary]
SECONARY RADAR [2-37] [8-37]
SECONDARY RADAR [5-3]
SECTIONAL CHARTS [7-4]
SECTOR [2-30] [2-40] [2-50] [2-51] [2-52] [2-53] [5-11] [5-31]
SECTOR ELIGIBILITY [5-195]
See And Avoid [Glossary]
Segmented Circle [Glossary]
Segments Of An Instrument Approach Procedure [Glossary]
SELECTED ALTITUDE LIMITS [5-194]
SELECTING ACTIVE RUNWAYS [3-3]
SELECTIVE ACTIVE RUNWAYS [3-4]
SEPARATION [5-70] [5-125] [7-42]
SEPARATION FROM OBSTRUCTIONS [5-75]
Separation [Glossary]
SEPARATION MINIMA [7-49]
Separation Minima [Glossary]
SEPARATION STANDARDS [1-9] [2-13] [4-90] [8-36] [10-34] [8-52] [8-53] [10-16]
SEPARATION WITHIN TRSA / TCA [7-92]
SEQUENCE APPLICATION [3-90]
SEQUENCED FLASHING LIGHTS [3-45]
SEQUENCING [7-76]
SEVERE WEATHER [2-102] [2-103] [5-125] [5-126]
Severe Weather Avoidance Plan/SWAP [Glossary]
Short Range Clearance [Glossary]
Short Takeoff And Landing Aircraft/STOL Aircraft [Glossary]
SIDE-STEP APPROCAH [4-86]
Sidestep Maneuver [Glossary]
SIGMET [2-101] [2-102]
Significant Meteorological Information/SIGMET [Glossary]
Simplified Directional Facility/SDF [Glossary]
SIMULATED FLAMEOUT APPROACH / SFO [3-134]
Simulated Flameout/SFO [Glossary]
SIMULTANEOUS APPROACH [3-52] [5-13] [5-126] [7-33]
SIMULTANEOUS DEPARTURES [5-113]
SIMULTANEOUS ILS APPROACHES [5-126]

[*References are to Paragraph numbers*]

Simultaneous ILS Approaches [Glossary]
SIMULTANEOUS LANDINGS [3-144]
SIMULTANEOUS OPPOSITE DIRECTION OPERATION [3-93]
SIMULTANEOUS RUNWAY USE [3-93]
SIMULTANEOUS SAME DIRECTION OPERATION [3-92]
SIMULTANEOUS TAKEOFF AND LANDING [3-123]
SIMULTANEOUS TAKEOFFS [3-144]
SIMULTANEOUSAPPROACH [5-115]
Single Direction Routes [Glossary]
Single Frequency Approach/SFA [Glossary]
Single-Piloted Aircraft [Glossary]
Slash [Glossary]
Slow Taxi [Glossary]
SOLO FLIGHTS [2-56]
SPACING APPLICATION [3-90]
SPATIAL DISORIENTATION [4-63]
Speak Slower [Glossary]
SPECIAL AR TRACKS [8-29]
Special Emergency [Glossary]
SPECIAL FLIGHT NUMBER [9-60]
SPECIAL INTEREST FLIGHTS [8-10] [8-11] [8-12]
SPECIAL MILITARY OPERATIONS [5-190]
Special Use Airspace [Glossary]
SPECIAL USE AIRSPACE/SUA [1-4] [8-40] [8-41] [8-42] [8-43] [10-33]
SPECIAL USE FREQUENCIES [8-31]
SPECIAL VFR [10-15]
SPECIAL VFR AIRCRAFT [2-4] [7-42]
SPECIAL VFR AND WEATHER [7-40]
SPECIAL VFR AUTHORIZATION [7-40]
SPECIAL VFR CLEARANCE [9-3]
Special VFR Conditions [Glossary]
SPECIAL VFR HELICOPTERS [7-49]
SPECIAL VFR OPERATIONS [7-44] [7-47]
Special VFR Operations [Glossary]
SPECIFIC ALERT SUPPRESSION MESSAGE [5-191]
SPECIFIED SPEED [5-101]
SPEED [2-15] [2-52] [2-53] [2-84] [3-11] [5-65] [10-10] [10-11]
SPEED ADJUSTMENT [5-102]
SPEED ADJUSTMENT APPLICATION [5-100]
Speed Adjustment [Glossary]
SPEED ADJUSTMENT METHODS [5-101]
SPEED ADJUSTMENTS [2-52] [2-53] [2-84] [5-100]
Speed Brakes/Dive Brakes [Glossary]
SPEED MINIMA [5-102]
SPEED REDUCTION [5-101]
SQUAWK [5-20]
Squawk (Mode, Code, Function) [Glossary]
SQUAWK ALTITUDE [5-38]
SQUAWK MAYDAY [5-27]
SQUAWK STANDBY [5-30]
SR71 / YF12 FLIGHTS [8-29] [8-30] [8-31] [8-38]
STAGE I SERVICE [7-60]
STAGE II SERVICE [5-13] [7-70] [7-90]
STAGE II SERVICE APPLICATION [7-70]
STAGE III SEPARATION AND SEQUENCING [7-92]
STAGE III SERVICE [1-4] [7-10] [7-96]
STAGE III VFR AIRCRAFT [3-102]
Stand By [Glossary]
STANDARD INSTRUMENT APPROACH [9-54]
STANDARD INSTRUMENT DEPARTURE (SID) [4-10] [4-21] [4-22] [4-30] [4-31]
Standard Instrument Departure/SID [Glossary]
Standard Rate Turn [Glossary]
STANDARD TAKEOFF MINIMA [3-100]
STANDARD TERMINAL ARRIVAL [4-30] [4-31]
STANDARD TERMINAL ARRIVAL / STAR [2-17] [4-5] [4-14] [4-60] [5-91]
Standard Terminal Arrival/STAR [Glossary]
STANDBY [5-52]
STANDBY OR LOW SENSITIVITY [5-32]
Stationary Reservations [Glossary]
Step Taxi [Glossary]
Step Turn [Glossary]
Stepdown Fix [Glossary]
Stereo Route [Glossary]
STOL AIRCRAFT OPERATIONS [3-123]
STOL RUNWAYS [3-61]
STOP ALTITUDE SQUAWK [5-38]
Stop Altitude Squawk [Glossary]
STOP AND GO [3-91]
STOP AND GO APPROACH [3-20]
STOP BUZZER [8-37]
STOP SQUAWK [5-40]
Stop Squawk (Mode Or Code) [Glossary]
Stop Stream/Burst/Buzzer [Glossary]
Stop-And-Go [Glossary]
Stop-Over Flight Plan [Glossary]
Stopway [Glossary]
STORED FLIGHT PLAN PROGRAM [4-22]
STRAIGHT-IN APPROACH [2-59] [4-80] [5-125] [6-60] [10-13]
Straight-In Approach - IFR [Glossary]
Straight-In Approach - VFR [Glossary]
STRAIGHT-IN APROACH [3-6]
Straight-in Landing [Glossary]
STRAIGHT-IN LANDINGS [5-126]
STRIP MARKING [2-30] [2-50] [2-52] [2-53] [2-58] [2-59]
STUDENT PILOTS [2-56]
SUBSTITUTE ROUTE [4-33]
Substitute Route [Glossary]
SUCCESSIVE DEPARTURES [5-113] [7-10]
SUFFIX [2-35]
Sunset And Sunrise [Glossary]
SUPERSONIC FLIGHTS [8-31]
SUPPRESS FUNCTION [5-215]
SUPPRESSING CONFLICT ALERT [5-190]
SUREILLANCE APPROACH [5-131]
SURFACE WIND INFORMATION [3-120]
SURVEILLANCE APPROACH [2-59] [5-7] [5-135] [5-150] [5-155] [5-168]
Surveillance Approach [Glossary]
SURVEILLANCE FINAL APPROACH [5-133]
SURVEILLANCE UNUSABLE [5-169]
SUSPICIOUS ACTIVITY [9-27]
SYSTEM DEVIATIONS [5-30]
SYSTEM REQUIREMENTS [5-213]
System Strategic Navigation/SN [Glossary]

T

T-VOR/Terminal-Very High Frequency Omnidirectional Range Station [Glossary]

[References are to Paragraph numbers]

TACAN / VORTAC [5-51]
TACAN-Only Aircraft [Glossary]
Tactical Air Navigation/TACAN [Glossary]
TAILWIND COMPONENTS [3-62]
TAKEOFF CLEARANCE [1-4] [1-20] [2-53] [2-59] [3-7] [3-31] [3-80] [3-109] [4-14] [4-20] [5-111] [7-41] [8-35] [3-90]
TAKEOFF POSITION HOLD [3-103]
TARGET DEVIATIONS [5-144]
Target [Glossary]
TARGET MARKERS [5-57]
TARGET SEPARATION [5-71]
Target Symbol [Glossary]
TAXI AND GROUND MOVEMENT [3-80]
Taxi [Glossary]
Taxi Into Position And Hold [Glossary]
Taxi Patterns [Glossary]
TAXI PROCEDURES [1-4] [1-20] [3-4] [3-33] [3-72] [3-81] [3-83] [3-103] [3-130] [10-4]
TAXI TO ISOLATED AREA [9-27]
TAXIWAY LIGHTS [3-54]
TCA FLOOR [7-97]
TCA METHODS [7-97]
TEARDROP PATTERN [9-54]
Terminal Area Facility [Glossary]
Terminal Area [Glossary]
TERMINAL CONTROL AREA / TCA [5-13] [7-90] [7-94] [7-97]
TERMINAL INSTRUMENT APPROACH PROCEDURES [2-111] [3-84] [4-71] [4-72] [4-85] [4-86] [5-72] [6-20] [7-2]
Terminal RADAR Program [Glossary]
TERMINAL RADAR SERVICE AREA / TRSA [5-13] [7-90] [7-94] [7-96]
Terminal RADAR Service Area/TRSA [Glossary]
TERMINAL TRAFFIC INFORMATION [2-20] [2-87]
TERMINATE RADAR MONITORING [5-126]
TERMINATING ARTS [5-213]
TERMS [5-61]
Terrain Following/TF [Glossary]
Tetrahedron [Glossary]
That Is Correct [Glossary]
Threshold Crossing Height/TCH [Glossary]
Threshold [Glossary]
Time Group [Glossary]
TIMED APPROACH [4-80] [5-124] [6-60] [6-61] [6-62] [10-1]
Torching [Glossary]
TOUCH AND GO [3-91]
Touch And Go/Touch And Go Landing [Glossary]
Touchdown [Glossary]
Touchdown Zone Elevation/TDZE [Glossary]
Touchdown Zone [Glossary]
TOUCHDOWN ZONE LIGHTS [3-49]
TOWER CLEARANCE [5-143]
TOWER EN ROUTE CONTROL / TEC [2-53] [4-52]
Tower En Route Control Service/Tower To Tower [Glossary]
TOWER RADAR DISPLAY [3-4] [3-6] [5-123]
Tower/Airport Traffic Control Tower [Glossary]
TPX-42 FACILITY [5-220]
TPX-42 [Glossary]
TPX-42 SYSTEM [5-37] [5-71] [5-220] [5-224] [5-225]
TPX-42 SYSTEM FUNCTIONAL USE [5-222]
TPX-42 SYSTEM REQUIREMENTS [5-223]
TPX-42 SYSTEM RESPONSIBILITY [5-221]
TPX-42 TAGS [5-223]
Track [Glossary]
TRACK SUSPEND FUNCTION [5-217]
TRAFFIC / TRAFFIC OBSERVED [5-61]
TRAFFIC ADVISORIES [7-79]
Traffic Advisories [Glossary]
TRAFFIC ADVISORY [2-16] [2-21] [7-60] [7-97] [8-71] [8-83]
TRAFFIC ADVISORY INFORMATION [7-79]
Traffic Alert [Glossary]
TRAFFIC BAYS [2-51]
TRAFFIC FOR COORDINATING SEPARATION [5-63]
Traffic [Glossary]
Traffic In Sight [Glossary]
TRAFFIC INFORMATION [3-6] [3-105] [3-134] [5-8] [7-3] [7-79] [7-80]
Traffic Information [Glossary]
Traffic No Longer A Factor [Glossary]
TRAFFIC PATTERN [2-4] [4-21]
Traffic Pattern [Glossary]
TRAFFIC PATTERN INFORMATION [3-120]
TRAFFIC RESTRICTIONS [9-40]
TRAFFIC RESUMPTION [9-42]
TRAFFIC SIGNALS [1-4] [3-20]
Transcribed Weather Broadcast/TWEB [Glossary]
TRANSFER COMMUNICATIONS [5-64]
Transfer Of Control [Glossary]
TRANSFER OF POSITION RESPONSIBILITY [2-23]
TRANSFER OF RADAR IDENTIFICATION [5-60]
TRANSFER RADAR IDENTIFICATION [5-62]
TRANSFERRING CONTOLLER [5-66]
TRANSFERRING CONTROLLER HANDOFF [5-64]
Transferring Controller/Facility [Glossary]
Transition [Glossary]
TRANSMISSION ACKNOWLEDGEMENT [5-139]
Transmissometer [Glossary]
Transmitting In The Blind/Blind Transmission [Glossary]
TRANSPONDER EQUIPMENT [2-35] [2-57] [5-3] [5-20] [5-39] [5-52] [9-43]
TRANSPONDER EQUIPPED BALLOONS [8-70]
Transponder [Glossary]
TRANSPONDER OPERATION [8-29]
TRANSPONDER REQUIREMENTS [5-39]
TRANSPONDER STANDBY OPERATION [5-31] [5-37]
TREND INFORMATION [5-154] [5-163]
TRSA DEPARTURE INFORMATION [7-95]
Turbojet Aircraft [Glossary]
Turboprop Aircraft [Glossary]
TURBULENCE REPORTING [2-101] [2-102] [6-52] [7-30]
22 KNOT RULE [6-31]
TYPE AIRCRAFT [2-87]

U

Ultrahigh Frequency/UHF [Glossary]
Unable [Glossary]
UNCONTROLLED AIRSPACE [4-34] [5-90]
Uncontrolled Airspace [Glossary]
Under-The-Hood [Glossary]
UNICOM [Glossary]
UNMANNED BALLOONS [8-70] [8-71]
Unpublished Route [Glossary]
UNSAFE RUNWAY INFORMATION [3-31]
UPT OPERATIONS [2-56]

[References are to Paragraph numbers]

Urgency [Glossary]
USE OF ACTIVE RUNWAYS [3-3]
USE OF TOWER RADAR DISPLAYS [3-9]

V

VECTOR AIRCRAFT [5-90] [7-97]
VECTOR FOR VISUAL APPROACH [7-31]
Vector [Glossary]
VECTOR TO ANOTHER RUNWAY [7-76]
VECTORING SERVICE [7-60]
VECTORS ACROSS FINAL [5-122] [5-123]
VECTORS BELOW MINIMUM ALTITUDE [5-112]
VECTORS FOR SIMULTANEOUS APPROACHES [7-31]
VECTORS TO FINAL APPROCAH COURSE [5-120]
VEHICLES ON RUNWAYS [3-5]
VERBAL COORDINATION [5-65]
VERIFICATION OF AUTOMATIC ALTITUDE [5-37]
Verify [Glossary]
Verify Specific Direction Of Takeoff (Or Turns After Takeoff) [Glossary]
VERTICAL SEPARATION [7-92]
Vertical Separation [Glossary]
Vertical Takeoff And Landing Aircraft/VTOL Aircraft [Glossary]
Very High Frequency/VHF [Glossary]
Very Low Frequency/VLF [Glossary]
VFR ADVISORY SERVICE [2-21]
VFR AIRCRAFT IN TCA [7-97]
VFR AIRCRAFT IN WEATHER DIFFICULTY [9-23]
VFR Aircraft/VFR Flight [Glossary]
VFR APPROACH CONTROL SERVICE [7-3] [7-30] [7-32]
VFR CODE ASSIGNMENTS [5-29]
VFR CONDITIONS [3-92] [7-2] [7-20]
VFR Conditions [Glossary]
VFR DEPARTURE CLEARANCE [4-17]
VFR DEPARTURE INFORMATION [7-79]
VFR DF SERVICE [9-53]
VFR FLIGHT [9-50]
VFR FLIGHT FOLLOWING [4-62] [5-51]
VFR FLIGHT PLAN [2-4] [2-32] [2-34] [2-56] [2-77] [4-17] [4-27] [5-29] [9-50]
VFR LANDING INFORMATION [7-3]
VFR Military Training Routes/VR [Glossary]
VFR Not Recommend [Glossary]
VFR OPERATIONS [2-4] [2-21] [2-32] [2-57] [4-17] [4-27] [4-54] [4-62] [4-90] [4-91] [5-90] [7-32] [7-40] [10-2] [10-14] [10-15]
VFR-ON-TOP [4-4]
VFR-ON-TOP BETWEEN SUNSET / SUNRISE [7-20]
VFR-ON-TOP CLIMB [7-20]
VFR-On-Top [Glossary]
VICTOR AIRWAY [4-31]
VICTOR AIRWAYS [2-90] [4-30]
VIDEO MAP [5-7] [5-9] [5-51]
Video Map [Glossary]
Visibility [Glossary]
VISIBILITY OBSERVATIONS [2-105]
VISUAL APPROACH [2-19] [2-20] [2-59] [4-62] [4-63] [4-65] [4-71] [4-72] [4-80] [5-13] [7-10] [7-30] [7-31] [7-33] [10-16] [10-35]
VISUAL APPROACH CLEARANCE [7-32]
VISUAL APPROACH CONDITIONS [7-30]
Visual Approach [Glossary]
VISUAL APPROACH SLOPE INDICATORS (VASI) [3-42]
VISUAL CONTACT [7-76]
Visual Descent Point/VDP [Glossary]
Visual Flight Rules/VFR [Glossary]
VISUAL HOLDING FIXES [7-4]
Visual Holding [Glossary]
VISUAL HOLDING OF VFR AIRCRAFT [7-4]
Visual Meteorological Conditions/VMC [Glossary]
VISUAL REFERENCE REPORT [5-151]
VISUAL REFERENCE TO THE SURFACE [7-49]
VISUAL SEPARATION [2-19] [2-20] [5-126] [7-1] [7-10] [7-30] [7-31] [7-32] [7-48] [7-92] [10-1] [10-3] [10-14]
Visual Separation [Glossary]
VOID TIME [4-23]
VOR/Very High Frequency Omnidirectional Range Station [Glossary]
VORTAC/VHF Omnidirectional Range/Tactical Air Navigation [Glossary]
Vortices/Wing-Tip Vortices [Glossary]
VOT/VOR Test Signal [Glossary]
VR ROUTE [5-33]

W

WAKE TURBULENCE [1-4] [1-23] [2-19] [2-20] [3-106] [3-107] [3-141] [5-74] [6-4] [6-5] [6-64] [7-34] [9-6] [10-34]
WAKE TURBULENCE ADVISORY [2-19]
WAKE TURBULENCE APPLICATION [5-72] [3-106] [3-108] [3-122] [3-123] [3-140] [5-72]
WAKE TURBULENCE APPLICATIONS [3-82]
Wake Turbulence [Glossary]
WAKE TURBULENCE PROCEDURES [2-19]
WAKE TURBULENCE SEPARATION [2-20]
WARNING AREA [5-33]
WARNING SIGNAL [3-21]
WAYPOINTS [2-52] [4-5]
Weather Advisory/WS/WA [Glossary]
WEATHER BROADCAST [2-101] [4-64] [4-72]
WEATHER CONDITIONS [2-9] [5-125] [5-130] [5-133] [7-32]
WEATHER CONDITIONS FOR VISUAL APPROACH [7-30]
WEATHER DEVIATIONS [2-103] [5-30]
WEATHER FORECAST [2-102] [4-50]
WEATHER MINIMUMS [2-105] [2-122] [4-50] [4-64] [4-67] [4-72] [5-131] [6-64] [6-66] [7-34] [10-15]
WEATHER OBSERVATIONS [2-105] [4-67] [4-72]
WEATHER RADAR [2-103] [2-106] [5-120] [7-77] [9-24]
WEATHER REPORTS [2-102] [2-105] [2-106] [2-111] [4-67] [4-82] [5-133] [6-63]
WHEELS DOWN CHECK [3-124] [5-140] [5-183]
WILCO [Glossary]
WIND DIRECTION [1-20] [2-84] [7-80]
WIND INFORMATION [3-125]
WIND SHEAR [2-102] [2-103] [3-8]
WIND SHEAR ADVISORIES [3-8]
Wind Shear [Glossary]
WITHHOLDING LANDING CLEARANCE [3-129]
Words Twice [Glossary]

☆U.S. GOVERNMENT PRINTING OFFICE: 1985 461 828 10013

Ai 7/3/984/ch.3

CHANGE

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

7110.65D CHG 3

NEWARK PUBLIC LIBRARY

6/28/85

SEP 5 1985

SUBJ: AIR TRAFFIC CONTROL

U. S. GOVT. PUBS.
DEPOSITORY 376

1. PURPOSE. This change transmits revised pages for Order 7110.65D, Air Traffic Control.

2. EFFECTIVE DATE. This change is effective September 26, 1985.

3. EXPLANATION OF CHANGES. The significant changes are listed below. If more information is desired, contact the office in the parentheses that follow the explanation.

a. 1-20. WORD MEANINGS. Adds a definition for "runway." (ATO-320)

b. 2-17. RADIO COMMUNICATIONS TRANSFER. Eliminates unnecessary verbiage for the controller and the pilot while maintaining the clarity of the message. (ATO-330.3)

c. 2-85. NUMBERS USAGE. Corrects the phraseology in 2-85g example by deleting "peak." (ATO-320)

d. 3-84. ILS CRITICAL AREAS. Adds a note to 3-84c(1) Illustration to reduce confusion. (ATO-330)

e. 4-23. DEPARTURE RESTRICTIONS AND CLEARANCE VOID/RELEASE TIMES. Incorporates the provisions of Notice 7110.932. (ATO-330)

f. 4-40. FLIGHT DIRECTION. Authorizes course and altitude assignment information for aircraft transitioning to/from oceanic airspace where composite separation is applied. (ATO-330)

g. 5-13. RADAR SERVICE TERMINATION. Ensures the guidelines are commensurate with the intent of the practical application of this procedure. (ATO-320)

h. 5-64. TRANSFERRING CONTROLLER HANDOFF. Corrects the intent of 5-64f by changing the "of" to "or." (ATO-330)

i. 5-75. SEPARATION FROM OBSTRUCTIONS. Changes the wording of 5-75a for consistency. (ATO-320)

j. 5-102. MINIMA (Speed Adjustment). Reinstates a speed minima that had been dropped from the handbook as a result of an administrative error. (ATO-320)

Distribution: ZAT-710 (ALL); ZAT-423 (ALL) **Initiated By:** ATO-300

TD 4. 308:

k. 5-113. SUCCESSIVE OR SIMULTANEOUS DEPARTURES. Considers helipads and helicopters' takeoff and landing courses as runways for the application of separation standards. (ATO-320)

l. 5-115. DEPARTURES AND ARRIVALS ON PARALLEL OR NONINTERSECTING DIVERGING RUNWAYS. See k.

m. 6-10. MINIMA ON DIVERGING COURSES. See k.

n. Appendix A. PILOT/CONTROLLER GLOSSARY.

(1) Area Navigation/RNAV. Provides additional information about airborne RNAV equipment and deletes little used information about RNAV low/high routes. (ATO-330.7)

(2) Radar Service Termination. See g.

(3) Waypoint. Relocates the definition for clarity. (ATO-330.7)

o. Appendix B. AIRCRAFT WEIGHT CLASSES AND GROUPS. Adds the provisions of Notice 7110.927 (Beech 1900, BAC Jetstream, Cessna Citation 650, and Fairchild FH-227/Metro IVC), and the Boeing 737S. (ATO-320)

p. Appendix C. STANDARD OPERATING PRACTICE (SOP) FOR TRANSFER OF RADAR IDENTIFICATION AND ASSOCIATED COORDINATION. Eliminates misunderstanding of the requirement to provide continuous target identity on radar point outs by deleting the phrase "if appropriate" from subparagraphs 4f(6)(a),(b), and (c) and 4g(7)(a) and (b). (ATO-330)

4. DISPOSITION OF TRANSMITTAL. This transmittal is to be retained until superseded by a new basic order.

5. PAGE CONTROL CHART. See the attachment for the page control chart.

for Walter H. [illegible]
John R. Ryan
Director, Air Traffic
Operations Service

PAGE CONTROL CHART

DELETE PAGES	DATED:	INSERT PAGES DATED 9/26/85
1-i	10/25/84	1-i
1-3	6/6/85	1-3
1-4	6/6/85	1-4
1-5	10/25/84	1-5
2-i	6/6/85	2-i
2-ii	6/6/85	2-ii
2-5	10/25/84	2-5
2-6	6/6/85	2-6
2-7	6/6/85	2-7
2-8	6/6/85	2-8
2-21	6/6/85	2-21
2-22	6/6/85	2-22
3-i	6/6/85	3-i
3-ii	6/6/85	3-ii
3-iii	6/6/85	3-iii
3-16	10/25/84	3-16
3-26	6/6/85	3-26
3-27	10/25/84	3-27
4-i	6/6/85	4-i
4-8	6/6/85	4-8
4-12	6/6/85	4-12
5-i	6/6/85	5-i
5-ii	6/6/85	5-ii
5-iii	6/6/85	5-iii
5-iv	6/6/85	5-iv
5-3	6/6/85	5-3
5-4	10/26/85	5-4
5-13	6/6/85	5-13
5-16	10/26/85	5-16
5-21	6/6/85	5-21
5-22	6/6/85	5-22
5-23 through 5-28	10/25/85	5-23 through 5-28
5-29 through 5-35	6/6/85	5-29 through 5-35
5-36	10/25/84	5-36

PAGE CONTROL CHART

DELETE PAGES	DATED:	INSERT PAGES DATED 9/26/85
5-37	6/6/85	5-37
5-38	10/25/84	5-38
5-39	6/6/85	5-39
5-40	10/25/84	5-40
5-41	6/6/85	5-41
5-42	10/25/85	5-42
5-43	6/6/85	5-43
6-1	10/25/84	6-1
6-1 through 6-3	10/25/84	6-1
7-1	6/6/85	7-1
7-11	6/6/85	7-11
7-14	6/6/85	7-14
A-7	6/6/85	A-7
A-30	6/6/85	A-30
A-41	6/6/85	A-41
A-42	6/6/85	A-42
B-1 through B-5	2/14/85	B-1 through B-5
C-1	1/25/85	C-1
C-2 through C-9	2/14/85	C-2 through C-9

TABLE OF CONTENTS

Page

Chapter 1. INTRODUCTION

Section 1. GENERAL

1-1 Purpose 1-1
1-2 Distribution 1-1
1-3 Cancellation 1-1
1-4 Explanation of Major Changes 1-1
1-5 Effective Date 1-2
1-6 Recommendations for Procedural Changes 1-2
1-7 Publications and Delivery Dates 1-2
1-8 Procedural Letters of Agreement 1-2
1-9 Constraints Governing Supplements and Procedural Deviations 1-2
1-10—1-19 Reserved 1-2

Section 2. TERMS OF REFERENCE

1-20 Word Meanings 1-3
1-21 Notes 1-3
1-22 References 1-3
1-23 Annotations 1-3
1-24 Abbreviations 1-3

Section 2. TERMS OF REFERENCE

1-20 WORD MEANINGS

As used in this manual:

a. *Shall,* or an action verb in the imperative sense, means a procedure is mandatory.

1-20 Examples. —

Issue an alternative clearance.

Authorize the aircraft to taxi.

The transferring controller *shall forward* these data to the receiving controller.

Do not clear an aircraft to land or takeoff from a closed runway.

b. *Should* means a procedure is recommended.

c. *May* or *need not* means a procedure is optional.

d. *Will* means futurity, not a requirement for application of a procedure.

e. Singular words include the plural.

f. Plural words include the singular.

g. *Aircraft* means the airframe, crew members, or both.

h. *Approved separation* means separation in accordance with the applicable minima in this manual.

i. *Altitude* means altitude mean sea level, flight level, or both.

j. *Miles* means nautical miles unless otherwise specified, and means statute miles in conjunction with visibility.

k. *Course, Bearing, Heading, and Wind Direction* information shall always be magnetic unless specifically stated otherwise.

l. *Time* when used in the context of a clock reading is the hour in Greenwich Mean Time (GMT) or the local equivalent, as appropriate, and the minutes. Change to the next minute is made at the minute plus 30 seconds, except time checks are given to the nearest quarter minute.

m. *Runway* means the runway used by aircraft (See Pilot/Controller Glossary) and in discussions of separation standards is applicable to helipads with accompanying takeoff/landing courses.

1-21 NOTES

Statements of fact, of a prefatory or explanatory nature relating to directive material, are set forth as notes.

1-22 REFERENCES

As used in this handbook, references direct attention to an additional source of information.

1-23 ANNOTATIONS

Revised, reprinted, or new pages are marked as follows:

a. The change number and effective date are printed on each revised or additional page.

b. Bold vertical lines in the margin of changed pages indicate the location of either substantive or editorial revisions to the handbook.

c. Paragraphs/sections annotated with *EN ROUTE* or *TERMINAL* are only to be applied by the designated type facility. When they are not so designated, the paragraphs/sections apply to both type (en route and terminal) facilities.

d. The annotation, *USAF* for U.S. Air Force, *USN* for U.S. Navy, and *USA* for U.S. Army denotes that the procedure immediately following applies only to the service designated.

1-23d Reference. — Military Procedures, 2-12.

e. *WAKE TURBULENCE APPLICATION* inserted within a paragraph means that the remaining information in the paragraph requires the application of wake turbulence procedures.

1-24 ABBREVIATIONS

As used in this manual, the following abbreviations have the meanings indicated.

Abbreviation	*Meaning*
ACLS	Automatic Carrier Landing System
ACP	Area Command Post
ADC	Aerospace Defense Command
AIM	Airman's Information Manual
AIRMET	Airmen's meteorological information
ALNOT	Alert notice
ALS	Approach light system
ALTRV	Altitude reservation
AMB	Ambiguity — A disparity greater than 2 miles exists between the position declared for a target by ARTS and another facility's computer declared position during interfacility handoff
ANG	Air National Guard
APREQ	Approval request
ARAC	Radar approach control facility (USA)
ARCP	Air refueling control point
ARINC	Aeronautical Radio Incorporated
ARIP	Air refueling initial point
ARSA	Airport Radar Service Area
ARSR	Air route surveillance radar
ARTCC	Air route traffic control center
ASDE	Airport surface detection equipment
ASR	Airport surveillance radar
ATC	Air traffic control
ATCAA	ATC assigned airspace

Abbreviation	*Meaning*
ATCCC	Air Traffic Control Command Center
ATCRBS	Air traffic control radar beacon system
ATCT	Airport traffic control tower
ATIS	Automatic terminal information service
ATPAC	Air Traffic Procedures Advisory Committee
ATS	Air Traffic Service
CACT	Civil air carrier turbojet
CARF	Central Altitude Reservation Function
CAT	Clear air turbulence
CELNAV	Celestial navigation training
CCC	Regional Communications Control Center
CERAP	Combined Center/RAPCON
CFCF	Central Flow Control Function
CWA	Center Weather Advisory
DF	Direction finder
DH	Decision height
DMAAC	Defense Mapping Agency Aerospace Center
DMAHC	Defense Mapping Agency Hydrographic Center
DME	Distance measuring equipment compatible with TACAN
DOE	Department of Energy
ECM	Electronic counter measure
EFAS	En route flight advisory service
EFC	Expect further clearance
ELT	Emergency locator transmitter
EOVM	Emergency obstruction video map
ETA	Estimated time of arrival
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FDEP	Flight data entry and printout
FIFO	Flight Inspection Field Office
FIR	Flight information region
FL	Flight level
FLIP	Flight Information Publication
FRC	Full route clearance necessary
FSDO	Flight Standards District Office
FSNFO	Flight Standards National Field Office
FSS	Flight service station
FTS	Federal Telecommunications System
FW/SVFR	Fixed-Wing Special Visual Flight Rules
GCA	Ground controlled approach
HIRL	High intensity runway lights
ICAO	International Civil Aviation Organization
IDENT	Aircraft identification
IFR	Instrument flight rules
IFSS	International flight service station
INF	Inland Navigation Facility
INREQ	Information request
IR	IFR military training route
JATO	Jet assisted takeoff
L/MF	Low/medium frequency
LAWRS	Limited aviation weather reporting station
LLWAS	Low level wind shear alert system

Abbreviation	*Meaning*
MALS	Medium intensity approach light system
MALSR	Medium approach light system with runway alignment indicator lights
MAP	Missed approach point
MARSA	Military authority assumes responsibility for separation of aircraft
MCA	Minimum crossing altitude
MDA	Minimum descent altitude
MEA	Minimum en route (IFR) altitude
MIRL	Medium intensity runway lights
MITO	Minimum interval takeoff
MOA	Military operations area
MOCA	Minimum obstruction clearance altitude
MSAW	Minimum Safe Altitude Warning
MRA	Minimum reception altitude
MSL	Mean sea level
MTI	Moving target indicator
MTR	Military training route
MVA	Minimum vectoring altitude
NAR	North American Route
NAS	National Airspace System
NAT	Not ARTS tracked (ARTS is not tracking the target and no ambiguity check can be made)
NBCAP	National Beacon Code Allocation Plan
NDB	Nondirectional radio beacon
NOAA	National Oceanic and Atmospheric Administration
NORAD	North American Air Defense Command
NOS	National Ocean Service
NWS	National Weather Service
NTZ	No transgression zone
ODALS	Omnidirectional approach lighting system
PAR	Precision approach radar
PDAR	Preferential departure arrival route
PBCT	Proposed Boundary Crossing Time
PCA	Positive control area
PAR	Preferential arrival route (Stage A)
PDR	Preferential departure route
PIDP	Programmable Indicator Data Processor
RAC	Department of Energy special flight
RAIL	Runway alignment indicator lights
RAPCON	Radar approach control facility (USAF)
RATCF	Radar air traffic control facility (USN)
RBS	Radar bomb scoring
RCC	Rescue Coordination Center
RCLS	Runway centerline system
RCR	Runway condition reading
REIL	Runway end identifier lights
RNAV	Area Navigation
RVR	Runway visual range
RVV	Runway visibility value
SAC	Strategic Air Command
SAFI	Semi-automatic flight inspection
SAR	Search and rescue
SFA	Single frequency approach
SFO	Simulated flameout

Abbreviation	*Meaning*
SID	Standard instrument departure
SIGMET	Significant meteorological information
STAR	Standard terminal arrival
STOL	Short takeoff and landing
SVFR	Special Visual Flight Rules
TACAN	TACAN-UHF navigational aid (omnidirectional course and distance information)
TCA	Terminal control area
TDZL	Touchdown zone light system
TRACAB	Terminal radar approach control in tower cab
TRACON	Terminal radar approach control
TRSA	Terminal radar service area
UHF	Ultra high frequency
USA	United States Army
USAF	United States Air Force
USN	United States Navy
UTM	Unsuccessful transmission message
VFR	Visual flight rules
VHF	Very high frequency
VOR	VHF navigational aid (omnidirectional course information)
VOR-DME	Collocated VOR and DME navigational aids (VHF course and UHF distance information)
VORTAC	Collocated VOR and TACAN navigation aids (VHF and UHF course and UHF distance information)
VR	VFR military training route
WSFO	Weather Service Forecast Office
WSO	Weather Service Office

TABLE OF CONTENTS

Page

Chapter 2. GENERAL

Section 1. GENERAL

2-1 ATC Service 2-1
2-2 Duty Priority 2-1
2-3 Procedural Preference 2-1
2-4 Operational Priority 2-1
2-5 Expeditious Compliance 2-2
2-6 Safety Advisory 2-2
2-7 In-Flight Equipment Malfunctions 2-3
2-8 Minimum Fuel 2-3
2-9 Reporting Essential Flight Information 2-3
2-10 NAVAID Malfunctions 2-3
2-11 Use of MARSA 2-3
2-12 Military Procedures 2-4
2-13 Formation Flights 2-4
2-14 Coordinate Use of Airspace 2-4
2-15 Control Transfer 2-4
2-16 Airport Traffic Areas 2-4
● 2-17 Radio Communications Transfer 2-5
2-18 Operational Requests 2-5
2-19 Wake Turbulence 2-6
2-20 Wake Turbulence Cautionary Advisories 2-6
2-21 Traffic Advisories 2-6
2-22 Bird Activity Information 2-7
2-23 Transfer of Position Responsibility 2-7
2-24—2-29 Reserved 2-7

Section 2. FLIGHT PLANS AND CONTROL INFORMATION

2-30 Recording Information 2-9
2-31 Forwarding Information 2-9
2-32 Forwarding VFR Data 2-9
2-33 Military DVFR Departures 2-9
2-34 IFR to VFR Flight Plan Change 2-9
2-35 IFR Flight Progress Data 2-9
2-36 Manual Input of Computer Assigned Beacon Codes 2-10
2-37 ALTRV Information 2-10
2-38 Computer Message Verification 2-10
2-39 Transmit Proposed Flight Plan 2-10
2-40 Forwarding Amended and UTM Data 2-11
2-41 Airborne Military Flights 2-11
2-42 Forwarding Flight Plan Data Between U.S. ARTCC's and Canadian ACC's 2-11
2-43 Teletype Flight Data Format—U.S. ARTCCs—Canadian ACC 2-11
2-44—2-49 Reserved 2-12

Section 3. FLIGHT PROGRESS STRIPS

2-50 General 2-13
2-51 Arrangement of Postings 2-13
2-52 Data Entries 2-14
2-53 Data Entries 2-15
2-54 Aircraft Identify 2-15
2-55 Aircraft Type 2-16
2-56 USAF/USN Undergraduate Pilots 2-16
2-57 Aircraft Equipment Suffix 2-16
2-58 Clearance Status 2-16

TABLE OF CONTENTS—Continued

Page

2-59 Control Symbology 2-16

2-60—2-69 Reserved 2-18

Section 4. RADIO AND INTERPHONE COMMUNICATIONS

2-70 Radio Communications 2-19

2-71 Monitoring 2-19

2-72 Pilot Acknowledgement/Readback 2-19

2-73 Authorized Interruptions 2-19

2-74 Authorized Transmissions 2-19

2-75 Authorized Relays 2-19

2-76 Radio Message Format 2-19

2-77 Abbreviated Transmissions 2-20

2-78 Interphone Transmission Priorities 2-20

2-79 Priority Interruption 2-20

2-80 Interphone Message Format 2-20

2-81 Interphone Message Termination 2-20

2-82 Words and Phrases 2-20

2-83 Emphasis for Clarity 2-20

2-84 ICAO Phonetics 2-21

● 2-85 Numbers Usage 2-21

2-86 Facility Identification 2-22

2-87 Aircraft Identification 2-23

2-88 Description of Aircraft Types 2-25

2-89 Reserved 2-25

Section 5. ROUTE AND NAVAID DESCRIPTION

2-90 Airways and Routes 2-26

2-91 NAVAID Terms 2-26

2-92 NAVAID Fixes 2-26

2-93—2-99 Reserved 2-26

Section 6. WEATHER INFORMATION

2-100 Familiarization 2-28

2-101 SIGMET or CWA Alert 2-28

2-102 PIREP Information 2-28

2-103 Weather and Chaff Services 2-29

2-104 Calm Wind Conditions 2-29

2-105 Reporting Weather Conditions 2-29

2-106 Disseminating Weather Information 2-30

2-107—2-109 Reserved 2-30

Section 7. ALTIMETER SETTINGS

2-110 Current Settings 2-31

2-111 Altimeter Settings Issuance Below Lowest Usable FL 2-31

2-112—2-119 Reserved 2-31

Section 8. RUNWAY VISIBILITY REPORTING — *TERMINAL*

2-120 Furnish RVR/RVV Values 2-32

2-121 Arrival/Departure Runway Visibility 2-32

2-122 Terminology 2-32

2-16a References. — Order 7210.3 — 430, Letters of Agreement. FAR 91.85, Operating on or in the Vicinity of an Airport. Glossary (Airport Traffic Area).

b. Coordinate with the appropriate control tower for transit authorization when you are providing radar traffic advisory service to an aircraft that will enter another facility's airport traffic area.

2-16b Note. — The pilot is not expected to obtain his own authorization through each area when in contact with a radar facility.

c. Transfer communications to the appropriate facility, if required, prior to operation within the airport traffic area.

2-16c References. — Radio Communications Transfer, 2-17. FAR 91.87, Operation at Airports with Operating Control Towers.

2-17 RADIO COMMUNICATIONS TRANSFER

a. Transfer radio communications before an aircraft enters the receiving controller's area of jurisdiction unless otherwise coordinated.

b. Transfer radio communications by specifying the following:

2-17b Note. — Radio communications transfer procedures may be specified by a letter of agreement or contained in the route description of an MTR and as published in the DOD Planning AP/1B (AP/3).

(1) The facility name or location name and terminal function to be contacted. *TERMINAL:* Omit the location name when transferring communications to another controller within your facility except as required in 5-137.

(2) Frequency to use except the following may be omitted:

(a) FSS frequency.

(b) Departure frequency if previously given or published on a SID chart for the procedure issued.

(c) *TERMINAL:*

(i) Ground or local control frequency if in your opinion the pilot knows which frequency is in use.

(ii) The numbers preceding the decimal point if the ground control frequency is in the 121 MHz bandwidth.

2-17b Examples. —

"Contact tower."

"Contact ground."

"Contact ground point seven."

"Contact ground, one two zero point eight."

"Contact Huntington Radio."

"Contact departure."

"Contact Los Angeles Center, one two three point four."

(3) Time, fix, altitude, or specifically when to contact a facility. You may omit this when compliance is expected upon receipt.

2-17b(3) Note. — The AIM, paragraph 340, informs pilots that they are expected to maintain a listening watch on the transferring controller's frequency until the time, fix, or altitude specified.

Phraseology:

CONTACT (facility name or location name and terminal function), (frequency).

If required,

AT (time, fix, or altitude).

c. In situations where a sector has multiple frequencies or when sectors are combined using multiple frequencies, and the aircraft will remain under your jurisdiction transfer radio communication by specifying the following:

Phraseology:

(Identification) CHANGE TO MY FREQUENCY (state frequency).

2-17c Example. —

"United 222 change to my frequency 123.4."

2-17c Reference. — AIM, paragraph 192d(2).

d. Avoid issuing a frequency change to helicopters known to be single piloted during air-taxiing, hovering, or low-level flight. Whenever possible, relay necessary control instructions until the pilot is able to change frequency.

2-17d Note. — Most light helicopters are flown by one pilot and require the constant use of both hands and feet to maintain control. Although flight control friction devices assist the pilot, changing frequency near the ground could result in inadvertent ground contact and consequent loss of control. Pilots are expected to advise ATC of their single pilot status if unable to comply with a frequency change.

2-17d. Reference. — AIM.

e. In situations where the controller does not want the pilot to change frequency but the pilot is expecting or may want a frequency change, use the following phraseology.

Phraseology:

REMAIN THIS FREQUENCY.

2-18 OPERATIONAL REQUESTS

Approve or disapprove a pilot's or vehicle operator's request as circumstances permit. In cases where specific phraseology is not set forth for the applicable procedure, use the following phraseology to approve or disapprove these requests.

Phraseology:

APPROVED AS REQUESTED.

(Requested operation) APPROVED.

UNABLE (requested operation).

When necessary,
(reason and/or additional instructions.)

2-19 WAKE TURBULENCE

a. Apply wake turbulence procedures to aircraft operating behind heavy jets and, where indicated, to small aircraft behind large aircraft.

2-19a Note.— Paragraph 5-72e specifies increased radar separation for small type aircraft landing behind large or heavy aircraft because of the possible effects of wake turbulence.

b. The separation minima shall continue to touchdown for all IFR aircraft not making a visual approach or maintaining visual separation.

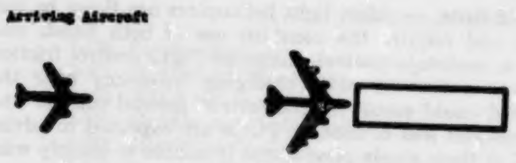
c. *USAF:* Separate aircraft other than heavy jets operating behind an A-300, B-747, C-5A, DC-10, or L-1011 — *10 miles or 4 minutes.*

2-20 WAKE TURBULENCE CAUTIONARY ADVISORIES

a. Issue wake turbulence cautionary advisories and the position, altitude if known, and direction of flight of the heavy jets to:

2-20a. Reference. — AC 90-23D, Pilot Responsibility, paragraph 12.

(1) *TERMINAL:* VFR aircraft not being radar vectored but are behind heavy jets.



2-20a(1) Illustration

(2) IFR aircraft that accept a visual approach or visual separation.

2-20a(2) Reference. — Visual Approach, 7-30.

(3) *TERMINAL:* VFR arriving aircraft that have previously been radar vectored and the vectoring has been discontinued.

b. Issue cautionary information to any aircraft if in your opinion wake turbulence may have an adverse effect on it. When traffic is known to be a heavy aircraft, include the word *heavy* in the description.

2-20b Note. — Wake turbulence may be encountered by aircraft in flight as well as when operating on the airport movement area. Because wake turbulence is unpredictable, the controller is not responsible for anticipating its existence or effect.

2-20b Reference. — Advisory Circular 90-23D. Glossary (Aircraft Classes and Wake Turbulence).

Phraseology:

CAUTION WAKE TURBULENCE (traffic information).

2-21 TRAFFIC ADVISORIES

Unless an aircraft is operating within the Positive Controlled Area or omission is requested by the pilot, issue traffic advisories to all aircraft (IFR or VFR) on your frequency when in your judgment their proximity may diminish to less than the applicable separation minima. Provide this service as follows:

a. To radar identified aircraft:

(1) Azimuth from aircraft in terms of the 12-hour clock, or

(2) When rapidly maneuvering civil test or military aircraft prevent accurate issuance of traffic as in (1) above, specify the direction from an aircraft's position in terms of the eight cardinal compass points(N, NE, E, SE, S, SW, W, and NW). This method shall be terminated at the pilot's request.

(3) Distance from aircraft in miles.

(4) Direction in which traffic is proceeding and/or relative movement of traffic.

2-21a(4) Note. — Relative movement includes closing, converging, parallel same direction, opposite direction, diverging, overtaking, crossing left to right, crossing right to left.

(5) If known, type of aircraft and altitude.

2-21a(5) Reference. — Description of Aircraft Types, 2-88.

(6) If Mode C altitude readout is not verified, state the word "unverified" after the altitude.

2-21a(6) Note. — In a radar environment, altitude information will be ascertained by either a report or verified Mode C. Altitude readout which is unverified may still be helpful provided the pilot knows it is not verified.

Phraseology:

TRAFFIC, (number) O'CLOCK *or, when appropriate,* (direction, (number) MILES, (direction)-BOUND *and/or* (relative movement), *and if known,* (type of aircraft and altitude).

If altitude is unknown,

ALTITUDE UNKNOWN.

If altitude is unverified Mode C,

(altitude) UNVERIFIED.

2-21a Examples. —

"Traffic, eleven o'clock, one zero miles, southbound, converging, DC-8, one seven thousand."

"Traffic, twelve o'clock, one five miles, opposite direction, altitude unknown."

"Traffic, two o'clock, one zero miles, westbound, six thousand five hundred unverified."

"Traffic, northeast, five miles, southbound, one five thousand five hundred unverified."

"Traffic, numerous targets, vicinity of Delia Airport."

(7) When requested by the pilot, issue radar vectors to assist in avoiding the traffic, provided the aircraft to be vectored is within your area of jurisdiction or coordination has been effected with the sector/facility in whose area the aircraft is operating.

(8) If unable to provide vector service, inform the pilot.

2-21a(8) Reference. — Operational Requests, 2-18.

(9) If the pilot informs you he does not see the traffic you have issued, inform him when the traffic is no longer a factor.

Phraseology:

TRAFFIC NO LONGER A FACTOR,

or

(number) O'CLOCK TRAFFIC NO LONGER A FACTOR,

or

(direction) TRAFFIC NO LONGER A FACTOR.

b. To aircraft that are not radar identified:

(1) Distance and direction from fix.

(2) Direction in which traffic is proceeding.

(3) If known, type of aircraft and altitude.

(4) ETA over the fix the aircraft is approaching, if appropriate.

Phraseology:

TRAFFIC, (number) MILES/MINUTES (direction) OF (airport or fix), (direction)-BOUND, *and if known,* (type of aircraft and altitude), ESTIMATED (fix) (time),

or

TRAFFIC, NUMEROUS TARGETS VICINITY (location).

If altitude is unknown,

ALTITUDE UNKNOWN.

2-21b Examples. —

"Traffic, one zero miles east of Forsythe V-O-R, southbound, DC-8, descending to one six thousand."

"Traffic, reported one zero miles west of Downey V-O-R, northbound, Apache, altitude unknown, estimated Joliet V-O-R one three one five."

"Traffic, eight minutes west of Chicago Heights V-O-R, westbound, Mooney, eight thousand, estimated Joliet V-O-R two zero three five."

2-22 BIRD ACTIVITY INFORMATION

a. Issue advisory information on pilot-reported, tower-observed, or radar-observed and pilot-verified bird activity. Include position, species or size of birds, if known, course of flight, and altitude. Do this for at least 15 minutes after receipt of such information from pilots or from adjacent facilities unless visual observation or subsequent reports reveal the activity is no longer a factor.

Phraseology:

FLOCK OF (species, if known) (size, if known) BIRDS, (number) O'CLOCK (number) MILES (direction)-BOUND, LAST REPORTED AT (altitude, as determined from pilot report),

or

ALTITUDE UNKNOWN.

FLOCK OF (species, if known) (size, if known) BIRDS (direction)-BOUND ALONG (flyway or geographical route), LAST REPORTED AT (altitude, as determined from pilot report),

or

ALTITUDE UNKNOWN.

FLOCK OF/NUMEROUS FLOCKS (species, if known)/(size, if known) BIRDS, VICINITY (location), LAST REPORTED AT (altitude, as determined from pilot report),

or

ALTITUDE UNKNOWN.

2-22a. Examples. —

"Flock of geese, one o'clock, seven miles, northbound, last reported at four thousand."

"Flock of small birds, southbound along Mohawk River, last reported at three thousand."

"Numerous flocks of ducks, vicinity Lake Winnebago, altitude unknown."

b. Relay bird activity information to adjacent facilities and to FSS's whenever it appears it will become a factor in their areas.

2-23 TRANSFER OF POSITION RESPONSIBILITY

The transfer of position responsibility shall be accomplished in accordance with the "Standard Operating Practice (SOP) for the Transfer of Position Responsibility," and the appropriate facility directives each time the operational responsibility for a position is transferred from one specialist to another.

2-24 thru 2-29 RESERVED

Section 2. FLIGHT PLANS AND CONTROL INFORMATION

2-30 RECORDING INFORMATION

a. Record domestic flight plans on flight plan forms or flight progress strips. Enter information required by the type of flight plan, existing circumstances, and future communications since all items are not necessary in each instance and not all entered will be transmitted when the flight plan is processed. Use authorized abbreviations when possible. When accepting flight plans for random RNAV routes, ensure that the route is defined by waypoints in terms of degree-distance fixes.

2-30a Note. — Generally, all military overseas flights are required to clear through a specified military base operations office (BASOPS). Pilots normally will not file flight plans directly with an FAA facility unless a BASOPS is not available. BASOPS will, in turn, forward the IFR flight notification message to the appropriate center.

b. When accepting flight plans for random routes that are defined by latitude/longitude coordinates, ensure that the route is identified by waypoints in terms of latitude/longitude fixes and departure/arrival fix identifiers. Latitude/longitude coordinates shall be recorded in degrees and minutes as follows: four figures describing latitude in degrees and minutes, followed by a solidus (/), and five figures describing longitude in degrees and minutes.

2-30b Example. —

"3559/11451"

c. *EN ROUTE:* When flight plans are filed directly with the center, record all items given by the pilot either on a flight progress strip or on a voice recorder. If the latter, enter in box 26 of the initial flight progress strip the sector or position number to identify where the information may be found in the event SAR activities become necessary.

2-31 FORWARDING INFORMATION

a. Except during Stage A operation, forward the flight plan information to the appropriate ATC facility, FSS, or BASOPS and record the time of filing and delivery on the form.

b. *EN ROUTE:* During Stage A operations, the above manual actions are required in cases where the data is not forwarded automatically by the computer.

2-31b Note.— During Stage A operation, data are exchanged between interfaced automated facilities and both the data and time of transmission are recorded automatically.

c. *EN ROUTE:* Forward proposed tower en route flight plans and any related amendments to the appropriate departure terminal facility.

2-32 FORWARDING VFR DATA

TERMINAL

Forward aircraft departure times to FSS's or military operations offices when they have requested them. Forward other VFR flight plan data only if requested by the pilot.

2-33 MILITARY DVFR DEPARTURES

TERMINAL

Forward departure times on all military DVFR departures from joint-use airports to the military operations office.

2-33 Note 1. — Details for handling air carrier, nonscheduled civil, and military DVFR flight data are contained in 7610.4.

2-33 Note 2. — Military pilots departing DVFR from a joint-use airport will include the phrase "DVFR to (destination)" in their initial call-up to an FAA operated tower.

2-34 IFR TO VFR FLIGHT PLAN CHANGE

Request a pilot to contact the appropriate FSS if he informs you of a desire to change from an IFR to a VFR flight plan.

2-35 IFR FLIGHT PROGRESS DATA

Forward control information from controller to controller within a facility, then to the receiving facility as the aircraft progresses along its route. Where appropriate, use computer equipment in lieu of manual coordination procedures. Ensure that flight plan and control information is correct and up-to-date. When covered by a letter of agreement/facility directive, the time requirements of a. may be reduced, and the time requirements of b(1) and 2-41a. may be increased up to 15 minutes when facilitated by automated systems or mandatory radar handoffs; or if operationally necessary because of manual data processing or nonradar operations, the time requirements of a. may be increased.

2-35 Note 1. — The procedures for preparing flight plan and control information related to altitude reservations (ALTRV's) are contained in Order 7210.3 — 1001. Development of the methods of assuring the accuracy and completeness of ALTRV flight plan and control information is the responsibility of the Military Liaison and Security Officer.

2-83a Reference. — Aircraft Identification, 2-87. Order 7210.3 — 210, Aircraft Identification Problems.

b. Identify the interphone voice line on which the call is being made when two or more such lines are collocated at the receiving operating position.

2-83b Examples. —

"Washington Center, Washington Approach on the 57 line." "Chicago Center, O'Hare Tower handoff on the Departure West line."

2-84 ICAO PHONETICS

Use the ICAO phonetic alphabet in the Table to clarify the individual letter, as necessary.

2-84 Table. — ICAO Phonetics

A — Alfa
B — Bravo
C — Charlie
D — Delta
E — Echo
F — Foxtrot
G — Golf
H — Hotel
I — India
J — Juliett
K — Kilo
L — Lima
M — Mike
N — November
O — Oscar
P — Papa
Q — Quebec
R — Romeo
S — Sierra
T — Tango
U — Uniform
V — Victor
W — Whiskey
X — X-ray
Y — Yankee
Z — Zulu

2-85 NUMBERS USAGE

State numbers as follows:

a. Serial numbers — The separate digits.

2-85a Examples. —

Number	*Statement*
11,495	"One one four niner five."
20,069	"Two zero zero six niner."

b. Altitudes or flight levels:

(1) Altitudes — The separate digits of the thousand plus the hundreds.

2-85b(1) Example. —

Altitude	*Statement*
17,900	"One seven thousand niner hundred."

(2) Flight levels — The words "flight level" followed by the separate digits of the flight level.

2-85b(2) Examples. —

Flight level	*Statement*
180	"Flight level one eight zero"
275	"Flight level two seven five."

(3) MDA/DH Altitudes — The separate digits of the MDA/DH altitude

2-85b (3) Examples. —

MDA/DH Altitude	*Statement*
1,320	"Published minimum descent altitude, one three two zero"
486	"Published decision height, four eight six"

c. Time:

(1) General time information — The 4 separate digits of the hour and minutes based on the 24-hour clock in terms of Greenwich Mean Time (GMT).

2-85c(1) Examples. —

Time (12 hr.)	*Time (24 hr.)*	*Statement*
1:15 a.m.	0115	"Zero one one five."
1:15 p.m.	1315	"One three one five."

(2) Upon request — The 4 separate digits of the hours and minutes in terms of GMT, followed by the local standard time equivalents.

2-85c(2) Example. —

Time	*Statement*
1430 PST (2230 GMT)	"Two two three zero Greenwich, one four three zero Pacific."

(3) Time check — The word "time" followed by the 4 separate digits of the hour and minutes, and nearest quarter minute.

2-85c(3) Example. —

Time	*Statement*
1415 ¾	"Time, one four one five and three-quarters."

(4) Abbreviated time — The separate digits of the minutes only.

2-85c(4) Examples. —

Time	*Statement*
1415	"One five."
1420	"Two zero."

d. Field elevation — The words "field elevation" followed by the separate digits of the elevation.

2-85d Examples. —

Elevation	*Statement*
17 feet	"Field elevation, one seven."
817 feet	"Field elevation, eight one seven."
2,817 feet	"Field elevation, two eight one seven."

e. The number "0," except where it appears in group form — The word "zero."

2-85e Example. —

"Field elevation one six zero."

f. Altimeter setting — The word "altimeter" followed by the separate digits of the altimeter setting.

2-85f Example. —

Setting	*Statement*
30.01	"Altimeter, three zero zero one."

g. Surface wind — The word "wind" followed by the separate digits of the indicated wind direction to the nearest 10-degree multiple, the word "at," and the separate digits of the indicated velocity in knots.

2-85g Examples. —

"Wind zero three zero at two five."

"Wind two seven zero at one five gusts three five."

h. Heading — The word "heading" followed by the 3 separate digits of the number of degrees, omitting the word "degrees." Use heading 360 degrees to indicate a north heading.

2-85h Examples.-

Heading	*Statement*
5 degrees	"Heading zero zero five."
30 degrees	"Heading zero three zero."
360 degrees	"Heading three six zero."

i. Radar beacon codes — The separate digits of the 4-digit code.

2-85i Examples. —

Code	*Statement*
1000	"One zero zero zero."
2100	"Two one zero zero."

j. Runways — The word "runway," followed by the separate digits of the runway designation. For a parallel runway, state the word "left," "right," or "center" if the letter "L," "R," or "C" is included in the designation.

2-85j Examples. —

Designation	*Statement*
3	"Runway Three."
8L	"Runway Eight Left."
27R	"Runway Two Seven Right."

k. Frequencies —

(1) The separate digits of the frequency, inserting the word "point" where the decimal point occurs. Omit digits after the second digit to the right of the decimal point. When the frequency is in the L/MF band, include the word "kiloHertz."

2-85k(1) Examples. —

Frequency		*Statement*
126.55	MHz	"One two six point five five."
369.0	MHz	"Three six niner point zero."
121.5	MHz	"One two one point five."
135.275	MHz	"One three five point two seven."
302	kHz	"Three zero two kiloHertz."

(2) *USAF/USN:* Local channelization numbers may be used in lieu of frequencies for locally based aircraft when local procedures are established to ensure that local aircraft and ATC facilities use the same channelization.

2-85k(2) Example. —

Frequency		*Statement*
275.8	MHz	"Local channel one six."

l. Speeds —

(1) The separate digits of the speed followed by "knots", except as required by 5-101, Methods (Speed Adjustment).

2-85l(1) Examples. —

Speed	*Statement*
250	"Two five zero knots."
190	"One niner zero knots."

(2) The separate digits of the mach number preceded by "mach."

2-85l(2) Examples. —

Mach Number	*Statement*
1.5	"Mach one point five."
0.64	"Mach point six four."
0.7	"Mach point seven."

m. Miles — The separate digits of the mileage followed by the word mile.

2-85m Examples. —

"Three zero mile arc east of Nottingham."

"Traffic, one o'clock, two five miles, northbound, DC-8, flight level two seven zero."

2-86 FACILITY IDENTIFICATION

Identify facilities as follows:

a. Airport traffic control towers — State the name of the facility followed by the word "tower." Where military and civil airports are located in the same general area and have similar names, state the name of the military service followed by the name of the military facility and the word "tower."

2-86a Examples. —

"Columbus Tower."

"Barksdale Tower."

"Navy Jacksonville Tower."

b. Air route traffic control centers — State the name of the facility followed by the word "center."

c. Approach control facilities, including RAPCON's, RATCF's, and ARAC's — State the name of the facility followed by the word "approach." Where military and civil facilities are located in the same general area and have similar names, state the name of the military service followed by the name of the military facility and the word "approach."

2-86c Examples. —

"Denver Approach."

"Griffiss Approach."

"Navy Jacksonville Approach."

TABLE OF CONTENTS

Page

Chapter 3. AIRPORT TRAFFIC CONTROL — *TERMINAL*

Section 1. GENERAL

3-1 Provide Service 3-1
3-2 Preventive Control 3-1
3-3 Use of Active Runways 3-1
3-4 Coordination Between Local and Ground Controllers 3-1
3-5 Vehicles/Equipment/Personnel on Runways 3-1
3-6 Traffic Information 3-2
3-7 Position Determination 3-2
3-8 Low Level Wind Shear Advisories 3-2
3-9 Use of Tower Radar Displays 3-2
3-10 Observed Abnormalities 3-3
3-11 Airport Traffic Area Restrictions 3-3
3-12 Visually Scanning Runways 3-3
3-13—3-19 Reserved 3-3

Section 2. VISUAL SIGNALS

3-20 Light Signals 3-4
3-21 Warning Signal 3-4
3-22 Receiver-Only Acknowledgment 3-4
3-23—3-29 Reserved 3-4

Section 3. AIRPORT CONDITIONS

3-30 Landing Area Condition 3-5
3-31 Closed/Unsafe Runway Information 3-5
3-32 Timely Information 3-5
3-33 Braking Action 3-5
3-34 Braking Action Advisories 3-6
3-35 Arresting System Operation 3-6
3-36—3-39 Reserved 3-7

Section 4. AIRPORT LIGHTING

3-40 Emergency Lighting 3-8
3-41 Runway End Identifer Lights 3-8
3-42 Visual Approach Slope Indicators (VASI) 3-8
3-43 Approach Lights 3-8
3-44 ALS Intensity Settings 3-8
3-45 Sequenced Flashing Lights 3-9
3-46 MALSR/ODALS 3-9
3-47 Runway Edge Lights 3-9
3-48 High Intensity Runway, Runway Centerline, and Touchdown Zone Lights 3-10
3-49 HIRL Associated with MALSR 3-10
3-50 HIRL Changes Affecting RVR 3-10
3-51 Medium Intensity Runway Lights 3-10
3-52 Simultaneous Approach and Runway Edge Light Operation 3-10
3-53 High Speed Turnoff Lights 3-10
3-54 Taxiway Lights 3-10
3-55 Obstruction Lights 3-10
3-56 Rotating Beacon 3-11
3-57—3-59 Reserved 3-11

Section 5. RUNWAY SELECTION

3-60 Selection 3-12

TABLE OF CONTENTS—Continued

Page

3-61 STOL Runways 3-12
3-62 Tailwind Components 3-12
3-63—3-69 Reserved 3-12

Section 6. AIRPORT SURFACE DETECTION PROCEDURES

3-70 Equipment Usage 3-13
3-71 Information Usage 3-13
3-72 Identification 3-13
3-73—3-79 Reserved 3-13

Section 7. TAXI AND GROUND MOVEMENT PROCEDURES

3-80 Ground Traffic Movement 3-14
3-81 Taxi and Ground Movement Operation 3-14
3-82 Ground Operations 3-14
3-83 Runway Proximity 3-15
● 3-84 ILS Critical Areas 3-15
3-85—3-89 Reserved 3-16

Section 8. SPACING AND SEQUENCING

3-90 Sequence/Spacing Application 3-17
3-91 Touch-and-Go or Stop-and-Go or Low Approach 3-17
3-92 Simultaneous Same Direction Operation 3-17
3-93 Simultaneous Opposite Direction Operation 3-17
3-94—3-99 Reserved 3-18

Section 9. DEPARTURE PROCEDURES AND SEPARATION

3-100 Departure Information 3-19
3-101 Departure Delay Information 3-19
3-102 Departure Control Instructions 3-19
3-103 Takeoff Position Hold 3-19
3-104 Anticipating Separation 3-20
3-105 Traffic Information — Departing Aircraft 3-20
3-106 Same Runway Separation 3-20
3-107 Intersection Takeoff 3-21
3-108 Intersecting Runway Separation 3-22
3-109 Takeoff Clearance 3-23
3-110 Cancellation of Takeoff Clearance 3-23
3-111—3-119 Reserved 3-23

Section 10. ARRIVAL PROCEDURES AND SEPARATION

3-120 Landing Information 3-24
3-121 Forwarding Approach Information by Nonapproach Control Facilities 3-24
3-122 Same Runway Separation 3-24
3-123 Intersecting Runway Separation 3-25
3-124 Wheels Down Check 3-27
3-125 Wind Information 3-27
3-126 Landing Clearance 3-27
3-127 Anticipating Separation 3-28
3-128 Landing Clearance Without Visual Observation 3-28
3-129 Withholding Landing Clearance 3-28
3-130 Runway Exiting 3-28
3-131 Altitude Restricted Low Approach 3-28
3-132 Closed Traffic 3-28
3-133 Overhead Approach 3-28
3-134 Simulated Flameout Operations/Practice Precautionary Approaches 3-29
3-135—3-139 Reserved 3-30

TABLE OF CONTENTS—Continued

Page

Section 11. HELICOPTER OPERATIONS

3-140 Taxi and Ground Movement Operation 3-31
3-141 Helicopter Takeoff Clearance 3-31
3-142 Helicopter Departure Separation 3-32
3-143 Helicopter Arrival Separation 3-32
3-144 Simultaneous Landings or Takeoffs 3-32
3-145 Helicopter Landing Clearance 3-32
3-146—3-149 Reserved 3-33

Section 12. SEA LANE OPERATIONS

3-150 Application 3-34
3-151 Departure Separation 3-34
3-152 Arrival Separation 3-34

3-82 Reference. — AC 90-23, Wake Turbulence, paragraphs 10 and 11.

3-83 RUNWAY PROXIMITY

Hold a taxiing aircraft clear of a runway as follows:

a. At established holding points marked by taxiway hold lines/signs.

b. If no hold lines/signs are established, instruct aircraft to hold short of a specific runway.

c. Issue traffic information as necessary.

3-83 Note. — Establishing hold lines/signs are the responsibility of the airport manager. Standards for accomplishing this are contained in Advisory Circulars 150/5340-1E and 150/5340-18A. Information on taxiway markings is published in the AIM.

3-83 Reference. — Taxi and Ground Movement Operation, 3-81; Altitude Restricted Low Approach, 3-131.

3-84 ILS CRITICAL AREAS

If an ILS critical area is marked and identifiable, restrict aircraft and surface vehicle operations, and provide information as follows when the ILS is being used for approach/landing guidance.

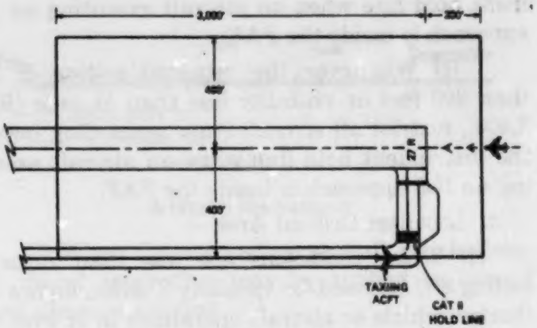
3-84 Note 1. — Restrictions to the operation of aircraft and vehicles are required to assure the integrity of ILS course signals and to meet obstacle clearance needs. Airport operators are responsible for installing and maintaining appropriate signs and markings delineating taxi lanes, hold lines, and no parking areas associated with ILS critical areas.

3-84 Note 2. — At USAF bases, the critical areas and the obstacle critical area (touchdown area) will be protected by an instrument hold line. An instrument hold line is marked only when a restriction short of the runway is necessary. See AFR 60-5 for the dimensions of the critical areas and the obstacle critical areas (touchdown areas).

3-84 NOTE 3. — For holding purposes, no point on the longitudinal axis of the aircraft is permitted past the hold line.

a. Obstacle Critical Area — A rectangular obstacle critical area surrounds the approach end of each Category II and Category III ILS runway. When conditions are reported ceiling less than 200 feet and/or RVR 2,000 or less *(USAF:* ½ mile if no RVR), do not authorize vehicles/aircraft to be in the area when an aircraft conducting an approach/missed approach enters/is over the area.

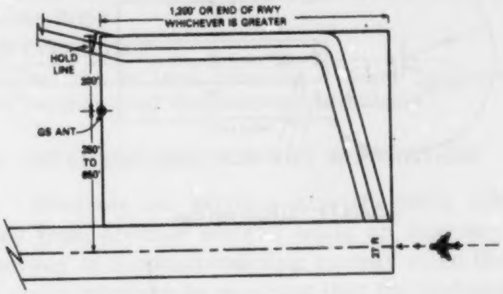
3-84a Note. — *USAF:* A rectangular obstacle critical area surrounds the approach end of each Category II/III ILS or PAR (with HAT below 200 feet) runway.



3-84a(1) Illustration

b. Glide Slope Critical Area —

(1) *USAF NOT APPLICABLE.* When conditions are less than reported ceiling 800 feet and/or visibility 2 miles, do not authorize vehicles/aircraft to operate in the area when an arriving aircraft is inside the ILS FAF unless that aircraft has reported the airport in sight and is circling/sidestepping to land on other than the ILS runway.



3-84b(1) Illustration

3-84b(1) Note. — The glide slope critical area extends to the near edge of the runway that the ILS serves. It does not include the runway.

3-84b(1) Reference. — Order 6750.16.

(2) *USAF:* The following glide slope critical area procedures apply to CAT I and II ILS systems. See AFR 60-5 for the glide slope critical area dimensions.

(a) Whenever the reported ceiling is at or above 800 feet and visibility at or above 2 miles, permit all aircraft to proceed to the runway hold line.

(b) Whenever the reported ceiling is less than 800 feet or visibility less than 2 miles, but at or above 200 feet or visibility at or above ½ mile (RVR 2,400), restrict all aircraft larger than fighter type/size from proceeding beyond the instru-

ment hold line when an aircraft executing an ILS approach is inside the FAF.

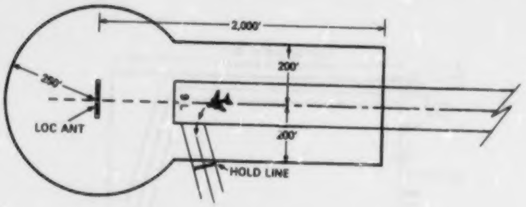
(c) Whenever the reported ceiling is less than 200 feet or visibility less than ½ mile (RVR 2,400), restrict all aircraft from proceeding beyond the instrument hold line when an aircraft executing an ILS approach is inside the FAF.

c. Localizer Critical Area —

(1) When conditions are less than reported ceiling 800 feet and/or visibility 2 miles, do not authorize vehicle or aircraft operations in or over the area when an arriving aircraft is between the ILS FAF and the airport, except:

(a) A preceding arriving aircraft on the same or another runway that passes over or through the area while landing or exiting the runway.

(b) A preceding departing aircraft or missed approach on the same or another runway that passes through or over the area.



3-84c(1) Illustration

3-84c(1) Illustration Note.— The principal purpose of this graphic is to illustrate the parameters of operations within the critical area, not to define the actual limits of the area. Refer to Order 6750.16 for the dimensions of the critical area for each specific antenna.

(2) In addition to (1) above, when conditions are reported ceiling less than 200 feet and/or RVR 2,000 or less *(USAF:* ½ mile if no RVR), do not authorize vehicle or aircraft operations in or over the area when an arriving aircraft is inside the ILS MM *(USAF:* 1 NM from TD if no MM).

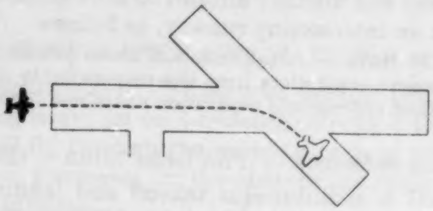
d. Glide Slope/Localizer Critical Area Advisories — When conditions are such that vehicle/aircraft restrictions in/over the areas are not required and an arriving aircraft advises the tower it will operate "Coupled" or "Autoland" or uses a similar phrase, promptly issue an advisory if a vehicle/aircraft will be in/over an area when the arriving aircraft is inside the ILS MM *(USAF:* 1 NM from TD if no MM).

Phraseology:

LOCALIZER/GLIDE SLOPE SIGNAL NOT PROTECTED.

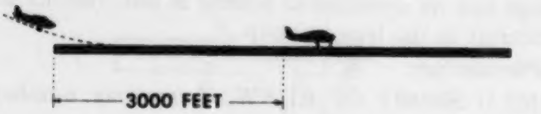
3-85 thru 3-89 RESERVED

need not be clear of the runway if the following minimum distance from the landing threshold exists:



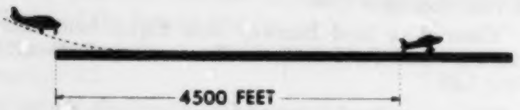
3-122a(1). Illustration

(a) When a Category I aircraft is landing behind a Category I or II — *3,000 feet.*



3-122a(1)(a) Illustration

(b) When a Category II aircraft is landing behind a Category I or II — *4,500 feet.*



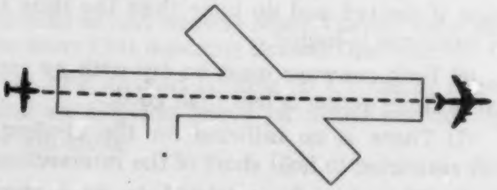
3-122a(1)(b) Illustration

(2) The other aircraft has departed and crossed the runway end. If you can determine distances by reference to suitable landmarks and the other aircraft is airborne, it need not have crossed the runway end if the following minimum distance from the landing threshold exists:

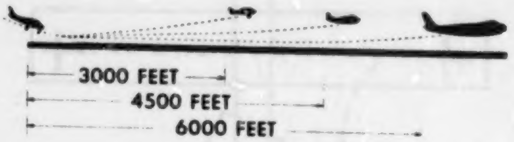
(a) Category I aircraft landing behind Category I or II — *3,000 feet.*

(b) Category II aircraft landing behind Category I or II — *4,500 feet.*

(c) When either is a category III aircraft — *6,000 feet.*



3-122a(2) Illustration 1



3-122a(2) Illustration 2

(3) When the succeeding aircraft is a helicopter, visual separation may be applied in lieu of using distance minima.

WAKE TURBULENCE APPLICATION

b. Issue wake turbulence cautionary advisories and the position, altitude if known, and direction of flight of the heavy jets to aircraft landing behind a departing/arriving heavy jet on the same or parallel runways separated by less than 2,500 feet.

3-122b Reference. — AC 90-23D, Pilot Responsibility, paragraph 12.

3-122b Example 1. —

"Cleared to land Runway Two Seven Left, caution wake turbulence, heavy Boeing 747 departing Runway Two Seven Right."

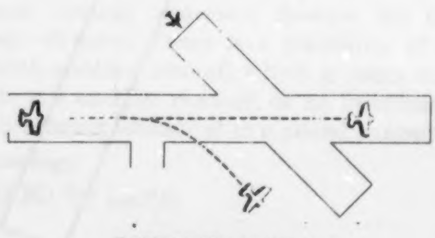
3-122b Example 2. —

"Number two to land, following a heavy Lockheed C5A on two-mile final. Caution wake turbulence."

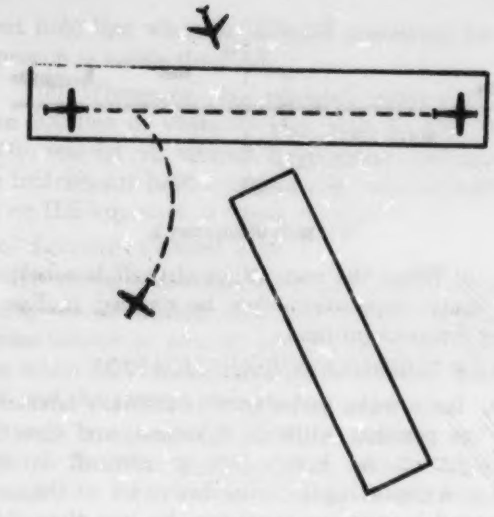
3-123 INTERSECTING RUNWAY SEPARATION

a. Separate an arriving aircraft using one runway from another aircraft using an intersecting runway or a nonintersecting runway when the flight paths intersect by ensuring that the arriving aircraft does not cross the landing threshold or flight path of the other aircraft until one of the following conditions exists:

(1) The preceding aircraft has departed and passed the intersection/flight path or is airborne and turning to avert any conflict.

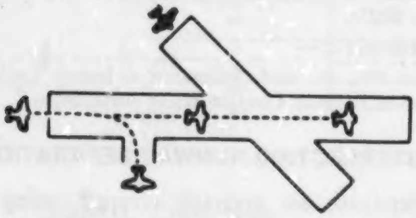


3-123a(1) Illustration 1

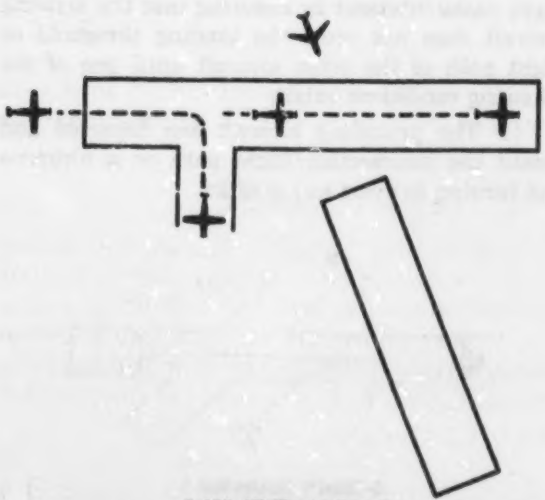


3-123a(1) Illustration 2

(2) A preceding arriving aircraft has taxied off the landing runway, completed landing roll and will hold short of the intersection/flight path, or has passed the intersection/flight path.



3-123a(2) Illustration 1



3-123a(2) Illustration 2

b. *USAF/USN NOT APPLICABLE.* Where approved by the air traffic manager and in accordance with a facility directive, you may authorize an aircraft to takeoff from one runway and another aircraft to land simultaneously on an intersecting runway or an aircraft to land on one runway and another aircraft to land simultaneously on an intersecting runway, as follows:

3-123b Note. — Application of these procedures does not relieve controllers from the responsibility of providing other appropriate separation contained in this handbook.

3-123b Reference. — FAA Order 7210.3 — 1226.

(1) A simultaneous takeoff and landing operation may be conducted only in VFR conditions between sunrise and sunset.

(2) Instruct the landing aircraft to hold short of the intersecting runway being used by the aircraft taking off. In the case of simultaneous landings and no operational benefit is lost, restrict the aircraft in the lesser Group.

Phraseology:

HOLD SHORT OF RUNWAY (runway number), (traffic or other information).

3-123b(2) Note. — Pilots who prefer to use the full length of the runway or a runway different from that specified are expected to advise ATC prior to landing.

(3) Issue traffic information to both aircraft involved and obtain an acknowledgment from each.

3-123b Example 1. —

"Cleared to land Runway One Eight, hold short of Runway One Four Left, traffic landing Runway One Four Left."

"Cleared to land Runway One Four Left, traffic landing Runway One Eight will hold short of the intersection."

3-123b Example 2. —

"Cleared to land Runway Three Six, hold short of Runway Three Three, traffic departing Runway Three Three."

"Traffic landing Runway Three Six will hold short of the intersection, cleared for takeoff."

(4) If requested by either aircraft, issue the measured distance from the landing threshold to the intersection.

3-123b(4) Example. —

"Distance from the landing threshold of Runway One Eight to the intersection of Runway One Four Left is six thousand feet."

(5) The conditions in (2), (3), and (4) shall be met in sufficient time for the pilots to take other action if desired and no later than the time landing clearance is issued.

(6) Both runways must be dry with no reports that braking action is less than good.

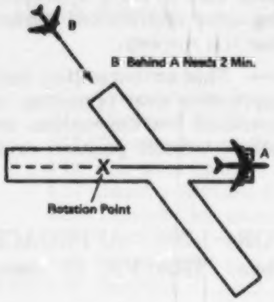
(7) There is no tailwind for the landing aircraft restricted to hold short of the intersection.

(8) The aircraft restricted to hold short is listed in Appendix B.

(9) STOL aircraft operations are in accordance with a letter of agreement with the aircraft operator/pilot, the aircraft is listed as a Group 1 in Appendix B, or the pilot confirms that it is a STOL aircraft.

WAKE TURBULENCE APPLICATION

c. Separate IFR/VFR aircraft landing behind a departing heavy jet on a crossing runway if the arrival will fly through the airborne path of the departure - ***2 minutes*** **or the appropriate radar separation minima.**

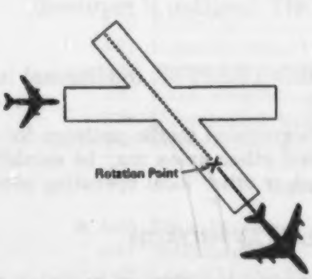


3-123c. Illustration

d. Issue wake turbulence cautionary advisories and the position, altitude if known, and direction of flight of the heavy jets to:

3-123d Reference. — AC 90-23D, Pilot Responsibility, paragraph 12.

(1) Aircraft landing on crossing runways behind a departing heavy jet if the arrival flight path will cross the takeoff path behind the heavy jet and behind the heavy jet rotation point.

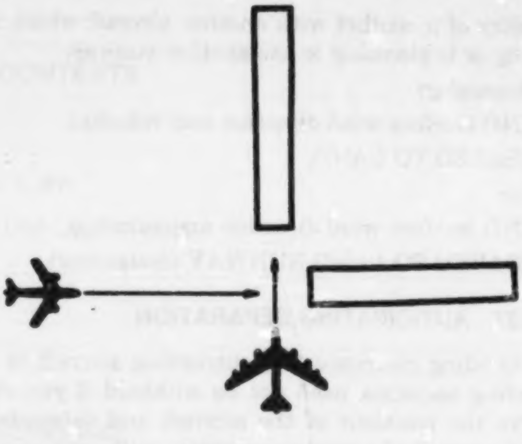


3-123d(1). Illustration

3-123d(1) Example. —

"Cleared to land Runway Niner. Caution wake turbulence, heavy C141 departing Runway One Five."

(2) VFR aircraft landing on a crossing runway behind an arriving heavy jet if the arrival flight path will cross.



3-123d(2) Illustration

3-123d(2) Example. —

"Cleared to land Runway Niner. Caution wake turbulence, heavy Boeing 747 landing Runway Three Six."

3-124 WHEELS DOWN CHECK

USA/USAF/USN

Remind aircraft to check wheels down when it reaches an appropriate position in the pattern unless the pilot has previously reported wheels down.

Phraseology:

CHECK WHEELS DOWN.

3-124 Note. — The intent is solely to remind the pilot to lower the wheels — not to place responsibility on the controller.

3-125 WIND INFORMATION

USA/USAF/USN

Issue surface wind when clearing aircraft for touch-and-go, stop-and-go, low approach, or the option.

3-126 LANDING CLEARANCE

Issue landing clearance. Restate the landing runway whenever there is a possibility of a conflict with another aircraft which is using or planning to use another runway, or an instrument approach is being conducted to a closed runway.

Phraseology:

CLEARED TO LAND,

or

CLEARED TO LAND RUNWAY (designator).

USA/USAF/USN

Issue surface wind and landing clearance. Restate the landing runway whenever there is a pos-

sibility of a conflict with another aircraft which is using or is planning to use another runway.

Phraseology:

WIND (surface wind direction and velocity),
CLEARED TO LAND,

or

WIND (surface wind direction and velocity),
CLEARED TO LAND RUNWAY (designator).

3-127 ANTICIPATING SEPARATION

Landing clearance to a succeeding aircraft in a landing sequence need not be withheld if you observe the positions of the aircraft and determine that prescribed runway separation will exist when the aircraft cross the landing threshold. Issue traffic information to the succeeding aircraft.

3-127 Example. —

"Delta Forty-two cleared to land. Traffic is Eastern DC-9 over approach lights."

3-128 LANDING CLEARANCE WITHOUT VISUAL OBSERVATION

When an arriving aircraft reports at a position where he should be seen but has not been visually observed, advise the aircraft as a part of the landing clearance that it is not in sight and restate the landing runway.

Phraseology:

NOT IN SIGHT, CLEARED TO LAND RUNWAY (designator).

3-128 Note. — Aircraft observance on the BRITE radar display satisfies the visually observed requirement.

3-129 WITHHOLDING LANDING CLEARANCE

Do not withhold a landing clearance indefinitely even though it appears a violation of FAR has been committed. The apparent violation might be the result of an emergency situation. In any event, assist the pilot to the extent possible.

3-130 RUNWAY EXITING

When appropriate, instruct aircraft where to turnoff runway after landing.

Phraseology:

TURN LEFT/RIGHT (turning point),

or

IF ABLE, TURN LEFT/RIGHT (turning point.)

3-130 Note. — It is not intended that runway exiting or taxi instructions normally be issued to airborne aircraft prior to landing.

3-131 ALTITUDE RESTRICTED LOW APPROACH

A low approach with an altitude restriction of not less than 500 feet above the airport may be authorized except over an aircraft in takeoff position or a departure aircraft. Do not clear aircraft for restricted altitude low approaches over personnel unless airport authorities have advised these personnel that the approaches will be conducted. Advise the approaching aircraft of the location of applicable ground traffic, personnel, or equipment.

3-131 Note 1. — The 500 feet restriction is a minimum. Higher altitudes should be used when warranted. For example, 1,000 feet is more appropriate for heavy aircraft operating over unprotected personnel or small aircraft on or near the runway.

3-131 Note 2. — This authorization includes altitude restricted low approaches over preceding landing or taxiing aircraft. Restricted low approaches are not authorized over aircraft in takeoff position or departing aircraft.

Phraseology:

CLEARED FOR LOW APPROACH AT OR ABOVE (altitude). TRAFFIC IS (description and location).

3-131 Reference. — Vehicles/Equipment/Personnel on Runways, 3-5; Traffic Information, 3-6; Light Signals, 3-20; Timely Information, 3-32 Takeoff Position Hold, 3-103; Same Runway Separation, 3-122.

3-132 CLOSED TRAFFIC

Approve/disapprove pilot requests to remain in closed traffic for successive operations subject to local traffic conditions.

Phraseology:

LEFT/RIGHT (if required) CLOSED TRAFFIC APPROVED. REPORT (position if required),

or

UNABLE CLOSED TRAFFIC, (additional information as required).

3-132 Note. — Segregated traffic patterns for helicopters to runways and other areas may be established by letter of agreement or other local operating procedures.

3-133 OVERHEAD APPROACH

Issue the following to arriving military aircraft that will conduct an overhead approach:

a. Pattern altitude and direction of traffic. Omit either or both if standard or when you know the pilot is familiar with a nonstandard procedure.

Phraseology:

PATTERN ALTITUDE (altitude). RIGHT TURNS.

b. Request for report on initial approach.

Phraseology:

REPORT INITIAL.

TABLE OF CONTENTS

Page

Chapter 4. IFR

Section 1. NAVAID USE LIMITATIONS

4-1 Altitude and Distance Limitations 4-1
4-2 Exceptions 4-1
4-3 Crossing Altitude 4-1
4-4 VFR-On-Top 4-2
4-5 Fix Use 4-2
4-6—4-9 Reserved 4-2

Section 2. CLEARANCES

4-10 Clearance Items 4-3
4-11 Clearance Prefix 4-3
4-12 Delivery Instructions 4-3
4-13 Clearance Relay 4-3
4-14 Route or Altitude Amendments 4-3
4-15 Through Clearances 4-3
4-16 ALTRV Clearance 4-4
4-17 IFR-VFR and VFR-IFR Flights 4-4
4-18—4-19 Reserved 4-4

Section 3. DEPARTURE PROCEDURES

4-20 Departure Terminology 4-5
4-21 Departure Clearances 4-5
4-22 Abbreviated Departure Clearance 4-6
4-23 Departure Restrictions and Clearance Void/Release Times 4-8
4-24 Delay Sequencing 4-8
4-25 Forward Departure Delay Information 4-8
4-26 Coordination with Receiving Facility 4-8
4-27 VFR Departure of IFR Departure 4-8
4-28 Forwarding Departure Times 4-9
4-29 Reserved 4-9

Section 4. ROUTE ASSIGNMENT

4-30 Route Use 4-10
4-31 Route Structure Transitions 4-10
4-32 Degree-Distance Route Definition USAF/USN 4-11
4-33 Alternative Routes 4-11
4-34 Uncontrolled Airspace 4-11
4-35—4-39 Reserved 4-11

Section 5. ALTITUDE ASSIGNMENT AND VERIFICATION

● 4-40 Flight Direction 4-12
4-41 Exceptions 4-12
4-42 Lowest Usable Flight Level 4-12
4-43 Adjusted Minimum Flight Level 4-12
4-44 Minimum En route Altitudes 4-13
4-45 Altitude Information 4-13
4-46 Anticipated Altitude Changes 4-14
4-47 Altitude Verification Non-Automatic Altitude Reporting 4-14
4-48—4-49 Reserved 4-15

Section 6. HOLDING AIRCRAFT

4-50 Clearance to Holding Fix 4-16

TABLE OF CONTENTS—Continued

Page

4-51 Clearance Beyond Fix 4-17
4-52 Delays 4-17
4-53 Holding Instructions 4-17
4-54 Visual Holding Points 4-17
4-55 Holding Flight Path Deviation 4-17
4-56 Unmonitored NAVAIDS 4-18
4-57 ILS Protection/Critical Areas 4-18
4-58—4-59 Reserved 4-18

Section 7. ARRIVAL PROCEDURES

4-60 Clearance Information 4-19
4-61 Advance Descent Clearance 4-19
4-62 Single Frequency Approaches (SFA) 4-19
4-63 Radio Frequency and Radar Beacon Changes for Military Aircraft 4-19
4-64 Military Turbojet En route Descent 4-20
4-65 Advance Approach Information 4-20
4-66 Arrival Information 4-20
4-67 Weather Information 4-21
4-68 Below Minima Report by Pilot 4-21
4-69 Transfer of Jurisdiction 4-21
4-70 Airport Conditions 4-21
4-71 Arrival Information by Approach Control Facilities 4-22
4-72 Approach Information by Approach Control Facilities 4-22
4-73 Switching ILS Runways 4-22
4-74—4-79 Reserved 4-23

Section 8. APPROACH CLEARANCE PROCEDURES

4-80 Approach Clearance 4-24
4-81 Clearance Limit 4-25
4-82 Relayed Approach Clearance 4-25
4-83 Altitude Assignment for Military High Altitude Instrument Approaches 4-25
4-84 Specifying Altitude 4-25
4-85 Circling Approach 4-25
4-86 Side-Step Maneuver 4-26
4-87 Communications Release 4-26
4-88 Missed Approach 4-26
4-89 Approach Information 4-26
4-90 Practice Approaches 4-26
4-91 Low Approach and Touch-and-Go 4-27

center when requesting clearance. "Request clearance for United Four Sixty-one to O'Hare."

4-22a(3) Example 2. — A center relay to the tower or Flight Service Station when initiating a clearance, "Clearance for United Four Sixty-one to O'Hare."

4-22a(3) Note. — Pilots are expected to furnish the facility concerned with destination airport information on initial radio call-up. This will provide the information necessary for detecting any destination airport differences on facility relay.

(4) The assigned altitude, according to the provisions in **4-21h**, is stated in the clearance.

b. If it is necessary to modify a filed route of flight, in order to achieve computer acceptance due, for example, to incorrect fix or airway identification, the contraction "FRC," meaning "Full Route Clearance Necessary," will be added to the remarks. The contraction "FRC" must always be the first item of intra-center remarks. When the contraction "FRC" appears on a flight progress strip, the controller issuing the ATC clearance to the aircraft shall issue a full route clearance.

4-22b Note. — Changes such as those made to conform with traffic flows and preferred routings are only permitted to be made by the pilot (or his operations office) or the controller responsible for initiating the clearance to the aircraft.

c. Specify the destination airport in the clearance.

d. When no changes are required in the filed route, state the phrase, "Cleared to (destination) airport, (SID and SID transition, as appropriate); then, as filed." If a SID is not assigned, follow with "As filed." Specify the assigned altitude; and, if required, add any additional instructions or information.

Phraseology:

CLEARED TO (destination) AIRPORT;
and, as appropriate,
(SID name and number) DEPARTURE,
(transition name) TRANSITION; THEN,
AS FILED.
MAINTAIN (altitude);
and, if required,
(additional instructions or information).
If a SID is not assigned,
CLEARED TO (destination) AIRPORT AS FILED.
MAINTAIN (altitude);
and, if required,
(additional instructions or information).

4-22d Examples. —

"Cleared to Reynolds Airport; David Two RNAV Departure, Kingham Transition; then, as filed. Maintain niner thousand. Expect flight level four one zero, one zero minutes after departure."

"Cleared to Reynolds Airport as filed. Maintain niner thousand. Expect flight level four one zero, one zero minutes after departure."

4-22d Note 1. — SID's are excluded from "cleared as filed" procedures.

4-22d Note 2. — If a pilot does not wish to accept an ATC clearance to fly a SID, he is expected to advise ATC or state "No SID" in his flight plan remarks.

e. When a filed route will require revisions, the controller responsible for initiating the clearance to the aircraft shall either:

(1) Issue a full route clearance; or

(2) If it reduces verbage, state the phrase, "Cleared to (destination) airport, (SID and SID transition, as appropriate), then as filed, except . . .." Specify the necessary revision; then, the assigned altitude; and if required, add any additional instructions or information. If a SID is not assigned, state, "Cleared to (destination) airport as filed, except . . .." Specify the necessary revision, the assigned altitude; and if required, add any additional instructions or information.

Phraseology:

CLEARED TO (destination) AIRPORT;
and, as appropriate,
(SID name and number) DEPARTURE,
(transition name) TRANSITION; THEN,
AS FILED, EXCEPT CHANGE ROUTE
TO READ (amended route portion).
MAINTAIN (altitude);
and if required,
(additional instructions or information).
If a SID is not assigned,
CLEARED TO (destination) AIRPORT AS FILED,
EXCEPT CHANGE ROUTE TO READ (amended route portion).
MAINTAIN (altitude);
and if required,
(additional instructions or information).

4-22e Examples. —

"Cleared to Reynolds Airport; South Boston One Departure; then, as filed, except change route to read, South Boston Victor Twenty Greensboro. Maintain eight thousand, report leaving four thousand."

"Cleared to Reynolds Airport as filed, except change route to read, South Boston Victor Twenty Greensboro. Maintain eight thousand, report leaving four thousand."

f. In a nonradar environment specify one, two, or more fixes, as necessary, to identify the initial route of flight.

4-22f Example. —

The filed route of flight is from Hutchins V10 Emporia, thence V10N and V77 to St. Joseph. The clearance will read:

"Cleared to Watson Airport as filed via Emporia, maintain seven thousand."

g. Do not apply these procedures when a pilot requests a detailed clearance or to military operations conducted within altitude reservations, stereo routes, operations above FL 600, and other military operations requiring special handling.

4-22g Note. — Departure clearance procedures and phraseology for military operations within approved altitude reservations, military operations above FL 600, and other military operations requiring special handling are contained in separate procedures in this handbook or in letters of agreement, as appropriate..

4-22g Reference. — ALTRV Clearances, 4-16; Military Operations Above FL 600, 8-30.

4-23 DEPARTURE RESTRICTIONS AND CLEARANCE VOID/RELEASE TIMES

a. Assign departure restrictions, clearance void times, or release times when necessary to separate departures from other traffic. The facility delivering a clearance to the aircraft containing a clearance void or release time shall issue a time check.

b. When issuing a "clearance void time" at airports not served by a control tower, provide alternate instructions to departing aircraft requiring the pilot to advise ATC of his intentions no later than 30 minutes after the clearance void time if not airborne.

Phraseology:

CLEARANCE VOID IF NOT OFF BY (clearance void time). IF NOT OFF BY (clearance void time), ADVISE (facility) NOT LATER THAN (time) OF INTENTIONS.

4-24 DELAY SEQUENCING

When aircraft elect to take delay on the ground before departure, issue departure clearances to them in the order in which the requests for clearance were originally made if practicable.

4-25 FORWARD DEPARTURE DELAY INFORMATION

Inform approach control facilities and/or towers of anticipated departure delays.

4-26 COORDINATION WITH RECEIVING FACILITY

a. Coordinate with the receiving facility before the departure of an aircraft if the departure point is less than 15 minutes flying time from the transferring facility's boundary unless an automatic transfer of data between automated systems will occur, in which case, the flying time requirement may be reduced to 5 minutes or replaced with a mileage from the boundary parameter when mutually agreeable to both facilities.

4-26a Note. — Agreements requiring additional time are encouraged between facilities that need earlier coordination. However, when agreements establish mandatory radar handoff procedures, coordination need only be effected in a timely manner prior to transfer of control.

4-26a Reference. — Radar Handoff Application, 5-60.

b. The actual departure time or a subsequent strip posting time shall be forwarded to the receiving facility unless assumed departure times are agreed upon and that time is within 3 minutes of the actual departure time.

4-27 VFR RELEASE OF IFR DEPARTURE

When an aircraft which has filed an IFR flight plan requests a VFR departure through a terminal facility, FSS, or air/ground communications station:

a. After obtaining, if necessary, approval from the facility/sector responsible for issuing the IFR clearance, you may authorize an IFR flight planned aircraft to depart VFR. Inform the pilot of the proper frequency and, if appropriate, where or when to contact the facility responsible for issuing the clearance.

b. If the facility/sector responsible or issuing the clearance is unable to issue a clearance, inform the pilot and suggest that the delay be taken on the ground. If the pilot insists upon taking off VFR and obtaining an IFR clearance in the air, inform the facility/sector holding the

g. Provide radar monitor when transition to or from a designated or established RNAV route is made along random RNAV routes.

h. Clear RNAV aircraft transitioning to or between designated or established RNAV routes direct to a named waypoint on the new route.

4-32 DEGREE-DISTANCE ROUTE DEFINITION USAF/USN

EN ROUTE

Do not accept a flight plan whose route or route segments do not coincide with designated airways or jet routes or with a direct course between NAVAID's unless the route or route segments are defined as follows:

4-32 Note. — The following military operations are authorized to define portions of their routing in accordance with degree-distance route definition:

a. Airborne radar navigation, radar bomb scoring (RBS), and airborne missile programming conducted by USAF, USN, and RAF.

b. Celestial navigation conducted by USAF, USN, and RAF.

c. Target aircraft operating in conjunction with ADC interceptors, and ADC interceptors while en route to and from assigned airspace.

d. Missions conducted above FL 450.

e. USN fighter and attack aircraft operating in positive control airspace.

f. USN/USMC aircraft, TACAN equipped, operating within the Honolulu FIR/Hawaiian airways area.

g. USAF/USN/USMC aircraft flight planned to operate on MTR's.

a. The portion of the route which cannot be defined by a designated airway or jet route or a course between NAVAID's is defined in the flight plan as a point composed of the following:

(1) A location identifier.

(2) Azimuth in degrees magnetic.

(3) Distance in miles from the NAVAID.

4-32a Example. —

"MKE 030025."

b. The NAVAID's selected are VOR/VOR-DME/VORTAC/TACAN NAVAID's authorized for use at the altitude being flown and the distance from the NAVAID does not exceed the distance criteria for the NAVAID being used.

4-32b Note. — Military aircraft using degree-distance procedures conduct operations in accordance with the following:

a. The departure and arrival phases are flight-planned to conform with the routine flow of traffic when operating within 75 miles of the departure and destination airport unless prior coordination has been effected with the appropriate air traffic control facility. Routings are defined via appropriate routes or airways, a direct course between NAVAID's, or as otherwise required to conform to the normal flow of traffic.

b. Flight plans are filed at least 2 hours before the estimated time of departure when any portion of the requested routing is defined in accordance with degree-distance procedures.

c. Airborne radar navigation and RBS aircraft conduct navigation to, from, or between special route definition fixes by the use of airborne radar, and in most cases airborne radar is used to provide navigation when the route is defined as direct over NAVAID's or over established route systems.

d. When ADC target force aircraft file flight plans to operate in the high altitude structure, they define degree-distance fixes based on high altitude en route NAVAID's depicted on high altitude charts, regardless of the type of NAVAID used to navigate to these fixes.

e. ADC target force aircraft maintain communications watch on 243.0 MHz and the appropriate ADC or ATC frequency while operating within an intercept area.

c. The distance between the fixes used to define the route does not exceed:

(1) Below FL 180 — 80 miles, except that for celestial navigation flights the distance in (2) shall apply between fixes used to define the celestial navigation portion of the route of flight.

(2) FL 180 and above — 260 miles.

d. Consider special route definition fixes as compulsory reporting points, except that an aircraft may be authorized to omit reports over these fixes when traffic conditions permit.

4-33 ALTERNATIVE ROUTES

When any part of an airway or route is unusable because of NAVAID status, clear aircraft via one of the following alternative routes:

a. A route depicted on current U.S. Government charts/publications. Use the word "substitute" immediately preceding the alternative route in issuing the clearance.

b. A route defined by specifying NAVAID radials or courses.

c. A route defined as direct to or between NAVAID's.

d. Vectors.

4-34 UNCONTROLLED AIRSPACE

Include routes through uncontrolled airspace only when requested by the pilot.

4-34 Note 1. — Flight plans filed for random RNAV routes through uncontrolled airspace are considered a request by the pilot.

4-34 Note 2. — Flight plans containing MTR segments in/through uncontrolled airspace are considered a request by the pilot/s.

4-35 thru 4-39 RESERVED

Section 5. ALTITUDE ASSIGNMENT AND VERIFICATION

4-40 FLIGHT DIRECTION

Clear aircraft at altitudes according to the Table.

4-40 Table. — Altitude Assignment

Aircraft Operating	*On course degrees magnetic*	*Assign*	Examples
Below 3,000 feet above surface	Any course	Any altitude	
Below FL 290	0 through 179	Odd cardinal altitudes or flight levels at intervals of 2,000 feet	3,000, 5,000, FL250, FL270
	180 through 359	Even cardinal altitudes or flight levels at intervals of 2,000 feet	4,000, 6,000, FL240, FL260
At or above FL 290	0 through 179	Odd cardinal flight levels at intervals of 4,000 feet beginning with FL 290	FL290, FL330, FL370
	180 through 359	Odd cardinal flight levels at intervals of 4,000 feet beginning with FL 310	FL310, FL350, FL390
Within an ALTRV	Any course	Any altitude or flight level	
In transition to/from Oceanic airspace where composite separation is authorized	Any course	Any odd or even cardinal flight level including those above FL290	FL280, FL290, FL300, FL310, FL320, FL330, FL340

4-41 EXCEPTIONS

When traffic, meteorological conditions, or aircraft operational limitations prevent assignment of altitudes prescribed in paragraph 4-40, assign any cardinal altitude or flight level below FL 290 or any odd cardinal flight level at or above FL 290 without regard to direction of flight as follows:

4-41 Note. — See 2-59 for control abbreviations and symbols to be used in conjunction with this paragraph.

a. For traffic conditions, take this action only if one of the following conditions exists:

(1) Aircraft remain within a facility's area and prior approval is obtained from other affected positions or sectors or the operations are covered in a Facility Directive.

(2) Aircraft will proceed beyond the facility's area and specific operations and procedures permitting random altitude assignment are covered in a letter of agreement between the appropriate facilities.

(3) Military aircraft are operating on random routes and prior approval is obtained from the facility concerned.

b. For meteorological conditions, take this action only if you obtain prior approval from other affected positions or sectors within your facility and, if necessary, from the adjacent facility concerned.

c. For aircraft operational limitations, take this action only if the pilot informs you the available appropriate altitude exceeds the operational limitations of his aircraft and only after you obtain prior approval from other affected positions or sectors within your facility and, if necessary, from the adjacent facility concerned.

d. For mission requirements, take this action only when the aircraft is operating on an MTR.

4-42 LOWEST USABLE FLIGHT LEVEL

If a change in atmospheric pressure affects a usable flight level in your area of jurisdiction, use the Table to determine the lowest usable flight level to clear aircraft at or above 18,000 feet msl.

4-42 Table. — Lowest Usable FL

Altimeter Setting	*Lowest Usable FL*
29.92" or higher	180
29.91" to 28.92"	190
28.91" to 27.92"	200

4-43 ADJUSTED MINIMUM FLIGHT LEVEL

When the prescribed minimum altitude for IFR operations is at or above 18,000 feet MSL, and the atmospheric pressure is less than 29.92", add the appropriate adjustment factor from the Table to the flight level equivalent of the minimum altitude in feet to determine the adjusted minimum flight level.

TABLE OF CONTENTS

Page

Chapter 5. RADAR

Section 1. GENERAL

5-1 Presentation and Equipment Performance 5-1
5-2 Alignment Check 5-1
5-3 Radar Use 5-1
5-4 Beacon Range Accuracy 5-1
5-5 ECM/ECCM Activity 5-2
5-6 Service Limitations 5-2
5-7 Electronic Cursor 5-2
5-8 Merging Target Procedures 5-3
5-9 Holding Pattern Surveillance 5-3
5-10 Deviation Advisories 5-3
5-11 Radar Fix Posting 5-3
5-12 Position Reporting 5-3
● 5-13 Radar Service Termination 5-3
5-14—5-19 Reserved 5-3

Section 2. BEACON SYSTEMS

5-20 Assignment Criteria 5-4
5-21 Discrete Environment 5-4
5-22 Nondiscrete Environment 5-4
5-23 Mixed Environment 5-4
5-24 Radar Beacon Code Changes 5-4
5-25 Function Code Assignments 5-4
5-26 Reverting to Broadband 5-5
5-27 Emergency Code Assignment 5-5
5-28 Radio Failure 5-6
5-29 VFR Code Assignments 5-6
5-30 Beacon Code for Pressure Suit Flights and Flights Above FL 600 5-6
5-31 Air Defense Exercise Beacon Code Assignment 5-6
5-32 Standby or Low Sensitivity Operation 5-7
5-33 Code Monitor 5-7
5-34 Failure to Display Assigned Beacon Code or Inoperative/Malfunctioning Transponder 5-8
5-35 Inoperative or Malfunctioning Interrogator 5-8
5-36 Failed Transponder in Positive Control Area 5-8
5-37 Verification of Automatic Altitude Readout 5-8
5-38 Automatic Altitude Reporting 5-9
5-39 In-Flight Deviations from Transponder/Mode C Requirements Between 12,500 Feet and 18,000 Feet .. 5-9
5-40 Beacon Termination 5-9
5-41—5-49 Reserved 5-9

Section 3. RADAR IDENTIFICATION

5-50 Application 5-10
5-51 Primary Radar Identification Methods 5-10
5-52 Beacon Identification Methods 5-10
5-53 ARTS/PIDP Identification Methods 5-11
5-54 Questionable Identification 5-11
5-55 Position Information 5-11
5-56 Identification Status 5-11
5-57 Target Markers 5-11
5-58—5-59 Reserved 5-11

Section 4. TRANSFER OF RADAR IDENTIFICATION

5-60 Application 5-12

TABLE OF CONTENTS—Continued

Page
5-61 Terms 5-12
5-62 Methods 5-12
5-63 Traffic 5-12
5-64 Transferring Controller Handoff 5-12
5-65 Receiving Controller Handoff 5-13
5-66 Point Out 5-14
5-67—5-69 Reserved 5-14

Section 5. RADAR SEPARATION

5-70 Application 5-15
5-71 Target Separation 5-15
5-72 Minima 5-15
5-73 Passing or Diverging 5-16
5-74 Additional Separation for Formation Flights 5-16
● 5-75 Separation From Obstructions 5-16
5-76 Adjacent Airspace 5-17
5-77 Edge of Scope 5-17
5-78 Beacon Target Displacement 5-17
5-79 GPA 102/103 Correction Factor 5-17
5-80—5-89 Reserved 5-17

Section 6. VECTORING

5-90 Application 5-18
5-91 Methods 5-18
5-92—5-99 Reserved 5-19

Section 7. SPEED ADJUSTMENT

5-100 Application 5-20
5-101 Methods 5-20
● 5-102 Minima 5-21
5-103 Limitations 5-21
5-104 Termination 5-21
5-105—5-109 Reserved 5-21

Section 8. RADAR DEPARTURES

5-110 Procedures 5-22
5-111 Initial Heading 5-22
5-112 Vectors Below Minimum Altitude 5-22
● 5-113 Successive or Simultaneous Departures 5-22
5-114 Departure and Arrival 5-23
● 5-115 Departures and Arrivals on Parallel or Nonintersecting Diverging Runways 5-23
5-116—5-119 Reserved 5-25

Section 9. RADAR ARRIVALS

5-120 Vectors to Final Approach Course 5-26
5-121 Final Approach Course Interception 5-26
5-122 Vectors Across Final Approach Course 5-26
5-123 Arrival Instructions 5-26
5-124 Approach Separation Responsibility 5-27
5-125 Parallel ILS Approach 5-28
5-126 Simultaneous ILS Approaches 5-28
5-127—5-129 Reserved 5-29

Section 10. RADAR APPROACHES — *TERMINAL*

5-130 Application 5-30
5-131 Approach Information 5-30
5-132 No-Gyro Approach 5-31

TABLE OF CONTENTS—Continued

Page

5-133 Lost Communications 5-31
5-134 Radar Contact Lost 5-31
5-135 Landing Check 5-31
5-136 Position Information 5-32
5-137 Final Controller Changeover 5-32
5-138 Communications Check 5-32
5-139 Transmission Acknowledgment 5-32
5-140 Wheels Down Check 5-32
5-141 Missed Approach 5-32
5-142 Low Approach and Touch-and-Go 5-32
5-143 Tower Clearance 5-32
5-144 Final Approach Abnormalities 5-33
5-145—5-149 Reserved 5-33

Section 11. SURVEILLANCE APPROACHES — *TERMINAL*

5-150 Altitude Information 5-34
5-151 Visual Reference Report 5-34
5-152 Descent Notification 5-34
5-153 Descent Instructions 5-34
5-154 Final Approach Guidance 5-34
5-155 Approach Guidance Termination 5-35
5-156—5-159 Reserved 5-35

Section 12. PAR APPROACHES — *TERMINAL*

5-160 Glidepath Notification 5-36
5-161 Decision Height (DH) Notification 5-36
5-162 Descent Instruction 5-36
5-163 Glidepath and Course Information 5-36
5-164 Distance from Touchdown 5-36
5-165 Decision Height 5-36
5-166 Position Advisories 5-36
5-167 Communication Transfer 5-36
5-168 Elevation Failure 5-36
5-169 Surveillance Unusable 5-37
5-170—5-179 Reserved 5-37

Section 13. USE OF PAR FOR APPROACH MONITORING — *TERMINAL*

5-180 Monitor on PAR Equipment 5-38
5-181 Monitor Availability 5-38
5-182 Monitor Information 5-38
5-183 Wheels Down Check 5-38
5-184—5-189 Reserved 5-39

Section 14. AUTOMATION — *EN ROUTE*

5-190 Conflict Alert 5-40
5-191 En route Minimum Safe Altitude Warning (E-MSAW) 5-40
5-192 Computer Entry of Assigned Altitude 5-40
5-193 Entry of Reported Altitude 5-40
5-194 Selected Altitude Limits 5-41
5-195 Sector Eligibility 5-41
5-196 Coast Tracks 5-41
5-197 Controller Initiated Coast Tracks 5-41
5-198—5-209 Reserved 5-41

Section 15. AUTOMATED RADAR TERMINAL SYSTEMS (ARTS) — *TERMINAL*

5-210 Application 5-42
5-211 Responsibility 5-42

TABLE OF CONTENTS—Continued

Page

5-212 Functional Use 5-42
5-213 System Requirements 5-42
5-214 Information Displayed 5-42
5-215 Conflict Alert 5-42
5-216 Inhibiting Minimum Safe Altitude Warning (MSAW) 5-42
5-217 Track Suspend Function 5-43
5-218—5-219 Reserved 5-43

Section 16. TPX-42 — *TERMINAL*

5-220 Application 5-44
5-221 Responsibility 5-44
5-222 Functional Use 5-44
5-223 System Requirements 5-44
5-224 Information Displayed 5-44
5-225 Altitude Filters 5-44
5-226 Inhibiting Low Altitude Alert System (LAAS) 5-44

5-8 MERGING TARGET PROCEDURES

a. Except while they are established in a holding pattern, apply merging target procedures to all radar identified:

(1) Aircraft at 10,000 feet and above.

(2) Turbojet aircraft regardless of altitude.

5-8a(2) Reference. — Glossary (Turbojet Aircraft).

(3) Presidential aircraft regardless of altitude.

b. Issue traffic information to those aircraft listed in a. whose targets appear likely to merge unless the aircraft are separated by more than the appropriate vertical separation minima.

c. If the pilot requests, vector his aircraft to avoid merging with the target of previously issued traffic.

5-8c Note. — Aircraft closure rates are so rapid that when applying merging target procedures, controller issuance of traffic must be commenced in ample time for the pilot to decide if a vector is necessary.

d. If unable to provide vector service, inform the pilot.

5-9 HOLDING PATTERN SURVEILLANCE

Provide radar surveillance of outer fix holding pattern airspace areas, or any portions thereof, shown on your radar scope (displayed on the video map or scribed on the map overlay) whenever aircraft are holding there. Attempt to detect any that stray outside the area. If you detect an aircraft straying outside the area, assist it to return to the assigned airspace.

5-10 DEVIATION ADVISORIES

Inform an aircraft when it is observed in a position and on a track which will obviously cause the aircraft to deviate from its protected airspace area. If necessary, assist the aircraft to return to the assigned protected airspace.

5-11 RADAR FIX POSTING

EN ROUTE

Except during full NAS Stage A operations: at lease once in each sector, record on the flight progress strip the time of observed position of each aircraft in "radar contact" with respect to a fix shown on the radar display.

5-12 POSITION REPORTING

a. If necessary, you may request an aircraft to provide an estimate or report over a specific fix.

5-12a Note. — After an aircraft receives the statement "radar contact" from ATC, it discontinues reporting over compulsory reporting points. It resumes normal position reporting when ATC informs it "radar contact lost" or "radar service terminated."

5-12a Reference. — Glossary (Radar Contact).

b. When required, inform an aircraft of its position with respect to a fix or airway.

Phraseology:

OVER/PASSING (fix)

(Number of miles) MILES FROM (fix).

(Number of miles) MILES (direction) OF (fix, airway, or location).

CROSSING/JOINING/DEPARTING (airway or route).

INTERCEPTING/CROSSING (name of NAVAID) (specified) RADIAL.

5-13 RADAR SERVICE TERMINATION

a. Inform aircraft when radar service is terminated.

Phraseology:

RADAR SERVICE TERMINATED (nonradar routing, if required).

b. Radar service is automatically terminated and the aircraft need not be advised of termination when:

5-13b Note. — Termination of radar monitoring when conducting simultaneous ILS approaches is prescribed in 5-126h(3). Termination of radar monitoring where PAR equipment is used to monitor approaches is prescribed in 5-182e.

(1) An aircraft cancels its IFR flight plan, except within a TCA, ARSA, TRSA, or where Stage II service is provided.

(2) An aircraft conducting an instrument, visual, or contact approach has landed or has been instructed to change to advisory frequency.

5-13(2) Note. — At tower controlled airports where radar coverage does not exist to the runway, arriving aircraft shall be informed when radar service is terminated.

(3) *TERMINAL:* An arriving VFR aircraft, receiving radar service to a tower controlled airport within a TCA, TRSA, ARSA, or where Stage II service is provided, has landed *OR* to all other airports, is instructed to change to tower or advisory frequency.

(4) *TERMINAL:* An aircraft completes a radar approach.

5-14 thru 5-19 RESERVED

Section 2. BEACON SYSTEMS

5-20 ASSIGNMENT CRITERIA

a. General

(1) Mode 3/A is designated as the common military/civil mode for air traffic control use.

(2) Make radar beacon code assignments to only Mode 3/A transponder equipped aircraft.

b. Unless otherwise specified in a directive or a letter of agreement, make code assignments to departing, en route, and arrival aircraft in accordance with the procedures specified in this section for the radar beacon code environment in which you are providing ATC service. Give first preference to the use of discrete beacon codes.

Phraseology:

SQUAWK THREE/ALFA (code).

or

SQUAWK (code).

5-20b Note. — A code environment is determined by an operating position's/sector's equipment capability to decode radar beacon targets using either the first and second or all four digits of a beacon code.

5-21 DISCRETE ENVIRONMENT

a. Issue discrete beacon codes assigned by the computer. Computer assigned codes may be modified as required.

(1) *TERMINAL:* Aircraft that will remain within the terminal facility's delegated airspace shall be assigned a code from the code subset allocated to the terminal facility.

(2) *TERMINAL:* Aircraft that will enter an adjacent ARTS facility's delegated airspace shall be assigned a beacon code assigned by the ARTCC computer.

5-21a(2) Note. — This will provide the adjacent facility advance information on the aircraft and will cause auto-acquisition of the aircraft prior to handoff.

b. Make handoffs to other positions/sectors on the computer assigned code.

c. Coastal facilities accepting "over" traffic that will subsequently be handed-off to an oceanic ARTCC shall reassign a new discrete beacon code to an aircraft when it first enters the receiving facility's airspace. The code reassignment shall be accomplished by inputting an appropriate message into the computer and issued to the pilot while operating in the first sector/position in the receiving facility's airspace.

5-21c Note. — Per an agreement between the FAA and the Department of Defense, 18 code subsets in the NBCAP have been reserved for exclusive military use in oceanic airspace. To maximize the use of these code subsets, they have also been allocated to ARTCCs underlying NBCAP airspace that do not abut an oceanic ARTCC's area. In order to preclude a potential situation where two aircraft might be in the same airspace at the same time on the same discrete code, it is necessary to reassign an aircraft another code as specified in 5-21c.

5-22 NONDISCRETE ENVIRONMENT

a. Assign appropriate nondiscrete beacon codes from the function codes specified in 5-25.

b. Unless otherwise coordinated at the time of handoff, make handoffs to other positions/sectors on an appropriate nondiscrete function code.

5-23 MIXED ENVIRONMENT

a. When discrete beacon code capability does not exist in your area of responsibility, comply with the procedures specified in 5-22.

5-23 Note. — In a mixed code environment a situation may exist where a discrete equipped position/sector exchanges control of aircraft with nondiscrete equipped facilities or vice versa.

b. When discrete beacon code capability exists in your area of responsibility:

(1) Comply with the procedures specified in 5-21, and

(2) Unless otherwise coordinated at the time of handoff, assign aircraft that will enter the area of responsibility of a nondiscrete equipped position/sector an appropriate nondiscrete function code from the codes specified in 5-25 prior to initiating a handoff.

5-24 RADAR BEACON CODE CHANGES

Unless otherwise specified in a directive or a letter of agreement or coordinated at the time of handoff, do not request an aircraft to change from the code it was squawking in the transferring facility's area until the aircraft is within your area of responsibility.

5-25. FUNCTION CODE ASSIGNMENTS

Unless otherwise specified by a Directive or a letter of agreement, make nondiscrete code assignments from the following categories:

a. Assign codes to departing IFR aircraft as follows:

(1) Code 2000 to an aircraft which will climb to FL 240 or above, or to an aircraft which will climb to FL 180 or above where the base of PCA and the base of the operating sector are at FL 180, and for inter-facility handoff, the receiving sector is also stratified at FL 180. The en route code shall not be

b. Verbally obtain the receiving controller's approval prior to making any changes to an aircraft's flight path, altitude, or data block information while the handoff is being initiated or after acceptance.

c. Ensure that potential conflicts are resolved prior to transferring communications and that restrictions issued to the aircraft to ensure separation are passed to the receiving controller.

d. Comply with restrictions issued by the receiving controller unless otherwise coordinated.

e. Transfer communications before an aircraft enters the receiving controller's area unless otherwise coordinated. To the extent possible, transfer communications when the handoff has been accepted.

5-64e Note. — Before ARTS Modify/Quick Look function is used to transfer radar identification, a facility directive which specifies communication transfer points is required.

f. Advise the receiving controller of pertinent information not contained in the data block or flight progress strip unless covered in a letter of agreement or facility directive. Pertinent information includes:

(1) Assigned heading.

(2) Air speed restrictions.

(3) Altitude information issued.

(4) Observed track or deviation from the last route clearance.

(5) The beacon code if different from that normally used or previously coordinated.

(6) Any other pertinent information.

g. Ensure that the data block is associated with the appropriate target.

h. Initiate verbal coordination to verify the position of primary or nondiscrete targets when using the automated handoff functions except for intrafacility handoffs using single-sensor systems or multisensor systems operating in a mosaic RDP mode.

i. Initiate verbal coordination before transferring control of a track when "CST," "FAIL," "NONE," "NB," or "IF" is displayed in the data block.

j. Advise the receiving controller that radar monitoring is required when the aircraft is on a direct route initiated by ATC that exceeds usable navaid distances.

k. Issue restrictions to the receiving controller which are necessary to maintain separation from other aircraft within your area of jurisdiction before releasing control of the aircraft.

l. Consider the target being transferred as identified on the receiving controller's display when the receiving controller acknowledges receipt verbally or has accepted an automated handoff.

5-65 RECEIVING CONTROLLER HANDOFF

The receiving controller shall:

a. Ensure that the target position corresponds with the position given by the transferring controller or that there is an appropriate association between an automated data block and the target being transferred before accepting an handoff.

b. Issue restrictions that are needed for the aircraft to enter your sector safely before accepting the handoff.

c. Comply with restrictions issued by the initiating controller unless otherwise coordinated.

d. If you need to change an aircraft's heading, speed, altitude, or beacon code within another controller's area of jurisdiction, coordinate such changes with that controller and, as required, any intervening controller through whose area the aircraft will pass, prior to making the change, unless such changes are covered by a letter of agreement or facility directive.

e. After accepting a handoff from another controller, confirm the identity of primary target by advising the aircraft of its position, and of a beacon target by observing a code change, an "Ident" reply, or a "standby" squawk unless one of these was used during handoff. These provisions do not apply at those towers and GCAs which have been delegated the responsibility for providing radar separation within designated areas by the parent approach control facility and the aircraft identification is assured by sequencing or positioning prior to the handoff.

5-65e Reference. — Approach Separation Responsibility, 5-124.

f. When using appropriate equipment, consider a discrete beacon target's identity to be confirmed when:

(1) The data block associated with the target being handed off indicates the computer assigned discrete beacon code is being received, or

(2) You observe the deletion of a discrete code that was displayed in the data block, or

5-65f(2) Note. — When the aircraft generated discrete beacon code does not match the computer assigned beacon code, the code generated will be displayed in the data block. When the aircraft changes to the assigned discrete code, the code disappears from the data block. In this instance, the observance of code removal from the data block satisfies confirmation requirements.

(3) You observe the numeric display of a discrete code that an aircraft has been instructed to squawk or reports squawking.

g. Initiate verbal coordination prior to accepting control of a track when "CST," "NAT," "AMB," "NONE," "OLD," "NB," "TU," "AM," or "OL" is displayed in the data block.

(1) When an automated interfacility handoff action is initiated and "AMB" or "AM" is displayed in the full data block, advise the other facility that a disparity exists between the position declared by their computer and that declared by your ARTS/PIDP.

(2) When an automated interfacility handoff action is initiated and "NAT" or "TU" is displayed in the full data block, advise the other facility if a disparity exists between the position declared by their computer and the actual target position.

5-66 POINT OUT

a. The transferring controller shall:

(1) Obtain verbal approval before permitting an aircraft to enter the receiving controller's delegated airspace.

(2) Obtain the receiving controller's approval before making any changes to an aircraft's flight path, altitude, or data block information after the point out has been approved.

(3) Comply with restrictions issued by the receiving controller unless otherwise coordinated.

(4) Be responsible for subsequent radar handoffs and communications transfer, including flight data revisions and coordination, unless otherwise agreed to by the receiving controller or as specified in a letter of agreement.

b. The receiving controller shall:

(1) Ensure that the target position corresponds with the position given by the transferring controller or that there is an association between a computer data block and the target being transferred prior to approving a point out.

(2) Be responsible for separation between point out aircraft and other aircraft for which he/she has separation responsibility.

(3) Issue restrictions necessary to provide separation from other aircraft within his/her area of jurisdiction.

5-67 thru 5-69 RESERVED

Section 5. RADAR SEPARATION

5-70 APPLICATION

a. Radar separation shall be applied to all RNAV aircraft operating on a random (impromptu) route at or below FL 450.

b. Radar separation may be applied between:

(1) Radar identified aircraft.

(2) An aircraft taking off and another radar-identified aircraft when the aircraft taking off will be radar-identified within 1 mile of the runway end.

(3) A radar-identified aircraft and one not radar-identified when either is cleared to climb/descend through the altitude of the other provided:

(a) The performance of the radar system is adequate and, as a minimum, primary radar targets are being displayed on the display being used within the airspace within which radar separation is being applied, and

(b) Flight data on the aircraft not radar-identified indicate it is a type which can be expected to give adequate primary return in the area where separation is applied, and

(c) The airspace within which radar separation is applied is not less than the following number of miles from the edge of the radar display:

(i) When less than 40 miles from the antenna — *6 miles;*

(ii) When 40 miles or more from the antenna — *10 miles;*

(iii) Narrowband radar operations — *10 miles,* and

(d) Radar separation is maintained between the radar-identified aircraft and all observed primary and secondary radar targets until nonradar separation is established from the aircraft not radar identified, and

(e) When the aircraft involved are on the same relative heading, the radar-identified aircraft is vectored a sufficient distance from the route of the aircraft not radar identified to assure the targets are not superimposed prior to issuing the clearance to climb/descend.

5-71 TARGET SEPARATION

Apply radar separation:

a. Between the centers of primary radar targets; however, do not allow a primary target to touch another primary target or a beacon control slash.

b. Between the ends of beacon control slashes.

5-71b Note. — At TPX-42 sites, the bracket video feature must be activated to display the beacon control slash.

c. Between the end of a beacon control slash and the center of a primary target.

d. All-Digital Displays: Between the centers of digitized targets. Do not allow targets to touch.

5-72 MINIMA

Separate aircraft by the following minima:

5-72 Note. — Wake Turbulence procedures specify increased separation minima required for certain classes of aircraft because of the possible effects of wake turbulence.

a. Broadband Radar System:

(1) When less than 40 miles from the antenna — *3 miles.*

(2) When 40 miles or more from the antenna — *5 miles.*

EN ROUTE:

b. Stage A/DARC:

(1) When less than 40 miles from the antenna:

(a) Below FL 180 — *3 miles,* except where facility directives specify *5 miles* separation.

5-72b(1)(a) Note. — Exception: Where a significant operational advantage is obtained by modifying a radar site adaptation, Facility Directives are required to define the areas where 5-mile separation applies.

5-72b(1)(a) Reference. — Order 7210.3 — 1020, Single Site Coverage.

(b) FL 180 to below FL 600 — *5 miles.*

(c) At or above FL 600 — *10 miles.*

(2) When 40 miles or more from the antenna:

(a) Below FL 600 — *5 miles.*

(b) At or above FL 600 — *10 miles.*

c. EARTS:

(1) When less than 40 miles from the antenna — *3 miles.*

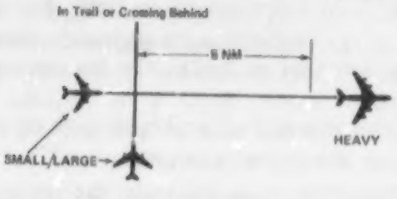
(2) When 40 miles or more from the antenna — *5 miles.*

WAKE TURBULENCE APPLICATION

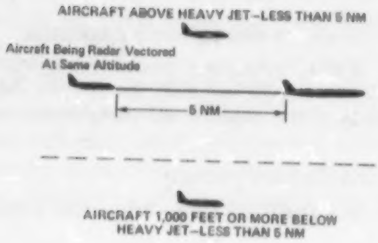
d. Separate aircraft operating directly behind, or directly behind and less than 1,000 feet below, or following an aircraft conducting an instrument approach by:

(1) Heavy behind heavy — *4 miles.*

(2) Small/large behind heavy — *5 miles.*



5-73d. Illustration 1


AIRCRAFT ABOVE HEAVY JET–LESS THAN 5 NM
Aircraft Being Radar Vectored At Same Altitude
5 NM
AIRCRAFT 1,000 FEET OR MORE BELOW HEAVY JET–LESS THAN 5 NM

5-73d Illustration 2

e. *TERMINAL:* In addition to **d**, separate an aircraft landing behind another aircraft on the same runway, or one making a touch-and-go, stop-and-go, or low approach by ensuring the following minima will exist at the time the preceding aircraft is over the landing threshold:

(1) Small behind large — *4 miles.*

(2) Small behind heavy — *6 miles.*

5-72d,e NOTE — Consider parallel runways less than 2,500 feet apart as a single runway because of the possible effects of wake turbulence.

5-73 PASSING OR DIVERGING

Except when using a full digital system, vertical separation between aircraft may be discontinued when the following conditions are met:

a. You observe that they have passed each other or that one has crossed the projected course of another.

b. Their tracks are monitored to assure that their primary targets or beacon control slashes will not touch.

c. Their courses diverge at least 15 degrees.

5-73 Note 1. — Full digital systems are those systems where broadband radar data is not used in the separation of aircraft.

5-73 Note 2. — Although vertical separation may be discontinued, the requirements of 5-72d and e must be applied when operating behind a heavy jet.

5-74 ADDITIONAL SEPARATION FOR FORMATION FLIGHTS

Because of the distance allowed between formation aircraft and lead aircraft, additional separation is necessary to ensure the periphery of the formation is adequately separated from other aircraft, adjacent airspace, or obstructions. Provide supplemental separation for formation flights as follows:

a. Separate a standard formation flight by adding 1 mile to the appropriate radar separation minima.

5-74a Reference. — Formation Flights, 2-13; Application, 5-70; Separation, 7-92.; Glossary (Formation Flight).

b. Separate two standard formation flights from each other by adding 2 miles to the appropriate separation minima.

c. Separate a nonstandard formation flight by applying the appropriate separation minima to the perimeter of the airspace encompassing the nonstandard formation or from the outermost aircraft of the nonstandard formation, whichever applies.

d. If necessary for separation between a nonstandard formation and other aircraft, assign an appropriate beacon code to each aircraft in the formation or to the first and last aircraft in-trail.

5-74 Note. — The additional separation provided in 5-74 is not normally added to wake turbulence separation when a formation is following a heavier aircraft since none of the formation aircraft are likely to be closer to the heavier aircraft than the lead aircraft (to which the prescribed wake turbulence separation has been applied).

5-75 SEPARATION FROM OBSTRUCTIONS

a. Except in En route Stage A/DARC, separate aircraft from prominent obstructions depicted on the radar scope (displayed on the video/geo map, scribed on the map overlay, or displayed as a permanent echo) by:

(1) When less than 40 miles from the antenna— *3 miles.*

(2) When 40 miles or more from the antenna— *5 miles.*

b. Except in En route Stage A/DARC, vertical separation of aircraft above a prominent obstruction displayed as a permanent echo may be discontinued after the aircraft is passed it.

c. En route Stage A/DARC: Apply the radar separation minima specified in 5-72b(1)(a).

5-75a,b, and c Note. — The determination of what constitutes a prominent obstruction is made locally after coordination with appropriate Flight Standards representatives.

bojet aircraft. Specifying which action is to be accomplished first removes any doubt the pilot may have as to controller intent or priority.

5-101b Note 2. — When specifying descent prior to speed reduction, consider the maximum speed requirements specified in FAR 91.70. It may be necessary for the pilot to level off temporarily and reduce speed prior to descending below 10,000 feet MSL.

c. Specify combined speed/altitude fix crossing restrictions.

Phraseology:

CROSS (fix) AT AND MAINTAIN (altitude) AT (specified speed) KNOTS.

5-101c Example. —

"Cross Robinsville at and maintain six thousand at two three zero knots."

5-102 MINIMA

Unless a pilot concurs in the use of a lower speed, use the following minima:

a. To aircraft operating between FL 280 and 10,000 feet, a speed not less than 250 knots or the equivalent mach number.

5-102a Note. — On a standard day the mach numbers equivalent to 250 knots CAS (subject to minor variations) are: FL 240 — 0.6; FL 250 — 0.61; FL 260 — 0.62; FL 270 — 0.64; FL 280 — 0.65; FL 290 — 0.66.

b. To arrival aircraft operating below 10,000 feet:

(1) Turbojet aircraft — A speed not less than 210 knots; except when the aircraft is within 20 flying miles of the runway threshold of the airport of intended landing, a speed not less than 170 knots.

(2) Reciprocating engine and turboprop aircraft — A speed not less than 200 knots; except when the aircraft is within 20 flying miles of the runway threshold of the airport of intended landing, a speed not less than 150 knots.

c. Departures:

(1) Turbojet aircraft — A speed not less than 230 knots.

(2) Reciprocating engine and turboprop aircraft — A speed not less than 150 knots.

d. Helicopters — A speed not less than 60 knots.

5-103 LIMITATIONS

Accomplish speed adjustment to aircraft which cannot attain the minimum speeds set forth in 5-102 by requesting such flights to, if practical:

a. Maintain a specified speed equivalent to that of the preceding or succeeding aircraft, or

b. Increase or decrease speed utilizing increments of 10 knots or multiples thereof.

Phraseology:

IF PRACTICAL, MAINTAIN (specific speed) KNOTS,

or

IF PRACTICAL, INCREASE/REDUCE SPEED (specified knots) KNOTS.

5-104 TERMINATION

Advise aircraft when speed adjustment is not longer needed.

Phraseology:

RESUME NORMAL SPEED.

5-105 thru 5-109 RESERVED

Section 8. RADAR DEPARTURES

5-110 PROCEDURES

Use standard departure routes and channelized altitudes whenever practical to reduce coordination. Do not, however, assign these routes solely to provide for possible radar or communication failure.

5-111 INITIAL HEADING

Before departure, assign the initial heading to be flown if a departing aircraft is to be vectored immediately after takeoff.

Phraseology:

FLY RUNWAY HEADING.

TURN LEFT/RIGHT, HEADING (degrees).

5-111 Note. — *TERMINAL:* A purpose for the heading is not necessary, since pilots operating in a radar environment associate assigned headings with vectors to their planned route of flight.

5-111 Reference. — Clearances, 4-21.

5-112 VECTORS BELOW MINIMUM ALTITUDE

Except in en route automated environments in areas where more than 3 miles separation minima is required, you may vector a departing IFR aircraft, or one executing a missed approach, within 40 miles of the antenna and before it reaches the minimum altitude for IFR operations if separation from prominent obstructions shown on the radar scope is applied in accordance with the following:

a. If the flight path is 3 miles or more from the obstruction and the aircraft is climbing to an altitude at least 1,000 feet above the obstruction, vector the aircraft to maintain at least 3 miles separation from the obstruction until the aircraft reports leaving an altitude above the obstruction.

b. If the flight path is less than 3 miles from the obstruction, and the aircraft is climbing to an altitude at least 1,000 feet above the obstruction, vector the aircraft to increase lateral separation from the obstruction until the 3-mile minimum is achieved or until the aircraft reports leaving an altitude above the obstruction.

5-113 SUCCESSIVE OR SIMULTANEOUS DEPARTURES

TERMINAL

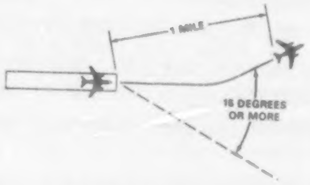
Separate aircraft departing from the same airport/heliport or adjacent airports/heliports in accordance with the following minima, provided radar identification with the aircraft will be established within 1 mile of the takeoff runway end/helipad and courses will diverge by 15 degrees or more.

5-113 Note 1. — Order 8260.19, Flight Procedures and Airspace, establishes guidelines for IFR departure turning procedures which assumes a climb to 400 feet before a turn is commenced. Order 8290.3, TERPS, the ILS missed approach criteria requires a straight climb of 400 feet be specified where turns greater than 15 degrees are required.

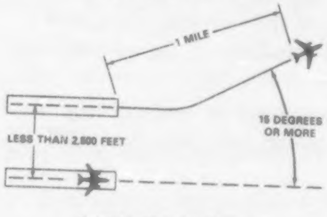
5-113 Note 2. — Consider known aircraft performance characteristics when applying initial separation to successive departing aircraft.

5-113 Note 3. — When one or both of the departure surfaces is a helipad, use the takeoff course of the helicopter as a reference, comparable to the centerline of a runway and the helipad center as the threshold.

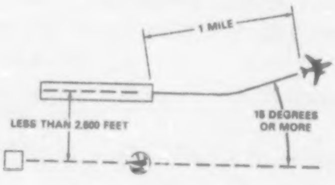
a. Between aircraft departing the same runway/helipad or parallel runways/helicopter takeoff courses separated by less than 2,500 feet — 1 mile if courses diverge immediately after departure.



5-113a Illustration 1



5-113a Illustration 2



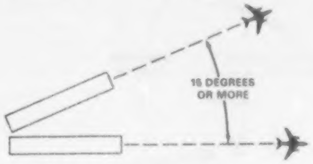
5-113a Illustration 3

5-113a Note. — This procedure does not apply when Category I or II aircraft are taking off from an intersection on the same runway behind a preceding departing Category III aircraft or when aircraft are departing behind a heavy jet.

5-113a Reference. — Intersecting Runway Separation, 3-108; Intersection Takeoff, 3-107; Minima, 5-72.

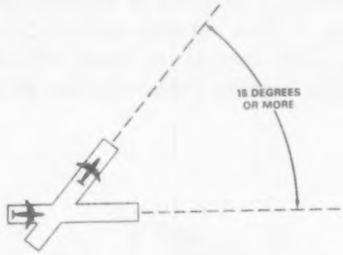
b. Between aircraft departing from diverging runways:

(1) Nonintersecting runways — Authorize simultaneous takeoffs if runways diverge by 15 degrees or more.

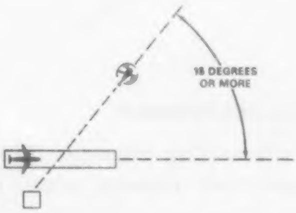


5-113b(1) Illustration

(2) Intersecting runways and/or helicopter takeoff courses which diverge by 15 degrees or more — Authorize takeoff of a succeeding aircraft when the preceding aircraft has passed the point of runway and/or takeoff course intersection. When applicable, apply the procedure in 3-104.



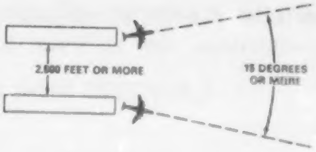
5-113b.(2) Illustration 1



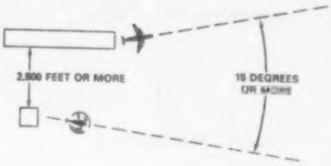
5-113b.(2) Illustration 2

5-113b(2) Note. — This procedure does not apply when aircraft are departing behind a heavy jet.

c. Between aircraft departing in the same direction from parallel runways/helicopter takeoff courses — Authorize simultaneous takeoffs if the centerlines/takeoff courses are separated by at least 2,500 feet and courses diverge by 15 degrees or more immediately after departure.



5-113c. Illustration 1



5-113c. Illustration 2

5-114 DEPARTURE AND ARRIVAL

TERMINAL

Except as provided in 5-115, separate a departing aircraft from an arriving aircraft on final approach by a minimum of *2 miles* if separation will increase to a minimum of 3 miles (5 miles when 40 miles or more from the antenna) within 1 minute after takeoff.

5-114 Note 1. — This procedure permits a departing aircraft to be released so long as an arriving aircraft is no closer than 2 miles from the runway at the time. This separation is determined at the time the departing aircraft commences takeoff roll.

5-114 Note 2. — Consider the effect surface conditions, such as ice, snow, and other precipitation may have on known aircraft performance characteristics, and the influence these conditions may have on the pilot's ability to commence takeoff roll in a timely manner.

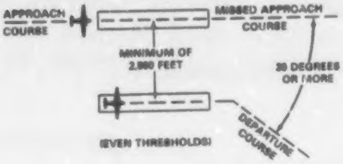
5-115 DEPARTURES AND ARRIVALS ON PARALLEL OR NONINTERSECTING DIVERGING RUNWAYS

TERMINAL

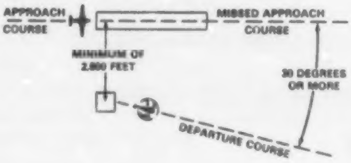
Authorize simultaneous operations between an aircraft departing on a runway and an aircraft on final approach to another parallel or nonintersecting diverging runway if the departure course diverges immediately by at least 30 degrees from the missed approach course until separation is applied and provided one of the following conditions are met:

5-115 Note. — When one or both of the takeoff/landing surfaces is a helipad, consider the helicopter takeoff course as the runway centerline and the helipad center as the threshold.

a. When parallel runway thresholds are even, the runway centerlines are at least 2,500 feet apart.


APPROACH COURSE
MISSED APPROACH COURSE
MINIMUM OF 2,500 FEET
30 DEGREES OR MORE
DEPARTURE COURSE
(EVEN THRESHOLDS)

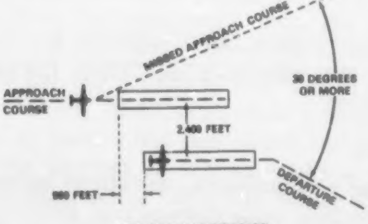
5-115a Illustration 1


APPROACH COURSE
MISSED APPROACH COURSE
MINIMUM OF 2,500 FEET
30 DEGREES OR MORE
DEPARTURE COURSE

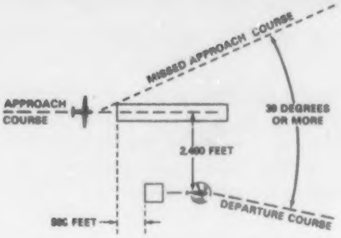
5-115a Illustration 2

b. When parallel runway thresholds are staggered and:

(1) The arriving aircraft is approaching the nearer runway — The centerlines are at least 1,000 feet apart and the landing thresholds are staggered at least 500 feet for each 100 feet less than 2,500 the centerlines are separated.


MISSED APPROACH COURSE
APPROACH COURSE
30 DEGREES OR MORE
2,400 FEET
500 FEET
DEPARTURE COURSE
(STAGGERED THRESHOLDS)

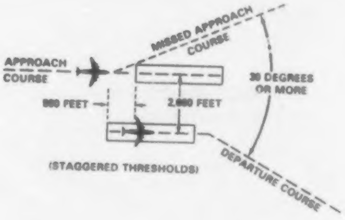
5-115b(1) Illustration 1


MISSED APPROACH COURSE
APPROACH COURSE
30 DEGREES OR MORE
2,400 FEET
DEPARTURE COURSE
500 FEET

5-115b(1) Illustration 2

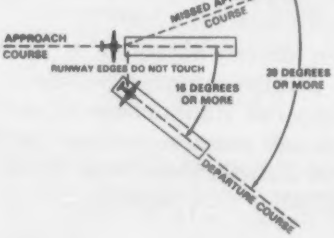
5-115b(1) Note. — In the event of a missed approach by a heavy jet, apply the procedures in 3-108 or ensure that the heavy jet does not overtake an aircraft departing from the adjacent parallel runway.

(2) The arriving aircraft is approaching the farther runway — The runway centerline separations exceeds 2,500 feet by at least 100 feet for each 500 feet the landing thresholds are staggered.


MISSED APPROACH COURSE
APPROACH COURSE
30 DEGREES OR MORE
500 FEET
2,600 FEET
(STAGGERED THRESHOLDS)
DEPARTURE COURSE

5-115b(2) Illustration

c. When nonintersecting runways diverge by 15 degrees or more and runway edges do not touch.


MISSED APPROACH COURSE
APPROACH COURSE
RUNWAY EDGES DO NOT TOUCH
15 DEGREES OR MORE
30 DEGREES OR MORE
DEPARTURE COURSE

5-115c Illustration

d. When the aircraft on takeoff is a helicopter, hold the helicopter until visual separation is possible or apply the separation criteria in a, b,orc above.

5-116 thru 5-119 RESERVED

Section 9. RADAR ARRIVALS

5-120 VECTORS TO FINAL APPROACH COURSE

Except as provided in 7-31, vector arriving aircraft to intercept the final approach course:

a. At least 2 miles outside the approach gate unless one of the following exists:

(1) When the reported ceiling is at least 500 feet above the MVA and the visibility is at least 3 miles (report may be a PIREP if no weather is reported for the airport), aircraft may be vectored to intercept the final approach course closer than 2 miles outside the approach gate, but no closer than the approach gate.

(2) If specifically requested by the pilot, aircraft may be vectored to intercept the final approach course inside the approach gate, but no closer than the final approach fix.

b. For a precision approach, at an altitude not above the glide slope.

c. For a nonprecision approach, at an altitude which will allow descent in accordance with the published procedure.

5-120c Note. — A pilot request for an "evaluation approach," or a "coupled approach," or use of a similar term, indicates he desires the application of 5-120a. and b.

5-121 FINAL APPROACH COURSE INTERCEPTION

Assign headings that will permit final approach course interception on a track that does not exceed the interception angles specified in the Table.

5-121 Note. — The intent is to provide for a track-course intercept angle judged by the controller to be no greater than specified by this procedure.

5-121 Reference. — Approaches, Chapter 5, Sections 10 and 11.

5-121 Table. — Approach Course Interception Angle.

Distance from interception point to approach gate	*Maximum interception angle*
Less than 2 miles	20 degrees
2 miles or more	30 degrees (45 degrees for helicopters)

5-122 VECTORS ACROSS FINAL APPROACH COURSE

Inform the aircraft whenever a vector will take it across the final approach course and state the reason for such action.

5-122 Note. — In the event you are unable to so inform the aircraft, the pilot is not expected to turn inbound on the final approach course unless approach clearance has been issued.

Phraseology:

EXPECT VECTOR ACROSS FINAL APPROACH COURSE FOR (purpose).

5-122 Example. —

"Expect vector across final approach course for spacing."

5-123 ARRIVAL INSTRUCTIONS

Issue all of the following to an aircraft before it reaches the approach gate:

a. Position relative to a fix on the final approach course. If none is portrayed on the radar display or if none is prescribed in the procedure, issue position information relative to the navigation aid which provides final approach guidance or relative to the airport.

b. Vector to intercept the final approach course, if required.

c. Approach clearance except when conducting a radar approach. Issue approach clearance only after the aircraft is:

(1) Established on a segment of a published route or instrument approach procedure, or

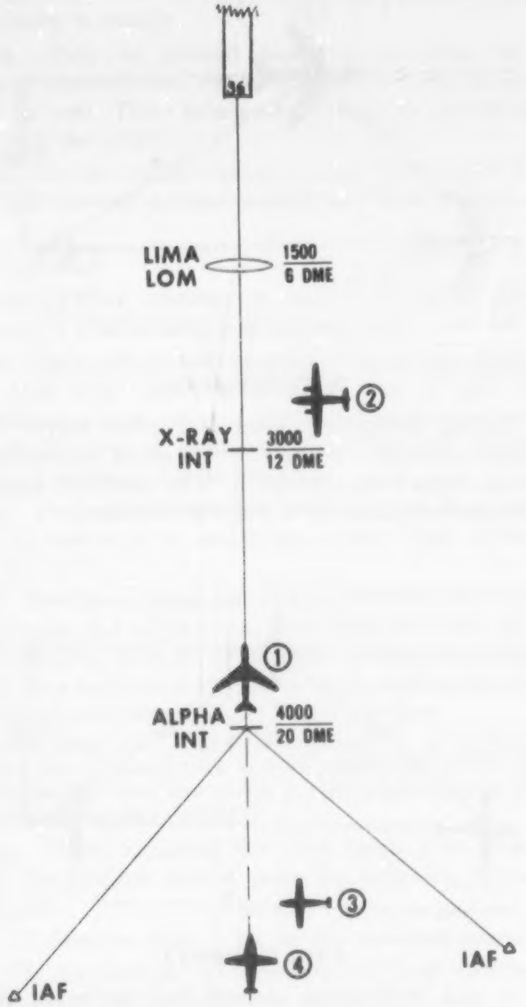
5-123c(1) Example. —

Aircraft 1 was vectored to the final approach course, but clearance was withheld. It is now at 4,000 feet and established on a segment of the instrument approach procedure. "Seven miles from X-ray. Cleared for I-L-S Runway Three Six Approach."

(2) Assigned an altitude to maintain until the aircraft is established on a segment of a published route or instrument approach procedure.

5-123c(2) Example 1. —

Aircraft 2 is being vectored to a published segment of the final approach course, 4 miles from Lima at 2,000 feet. The MVA for this area is 2,000 feet. "Four miles from Lima. Turn right heading three four zero. Maintain two thousand until established on the localizer. Cleared for I-L-S Runway Three Six Approach."



5-123c Illustration

5-123c(2) Example 2. —

Aircraft 3 is being vectored to intercept the final approach course beyond the approach segments, 5 miles from Alpha at 5,000 feet. The MVA for this area is 4,000 feet. "Five miles from Alpha. Turn right heading three three zero. Cross Alpha at or above four thousand. Cleared for I-L-S Runway Three Six Approach."

5-123c(2) Example 3. —

Aircraft 4 is established on the final approach course beyond the approach segments, 8 miles from Alpha at 6,000 feet. The MVA for this area, is 4,000 feet. "Eight miles from Alpha. Cross Alpha at or above four thousand. Cleared for I-L-S Runway Three Six Approach."

5-123c(2) Note 1. — The altitude assigned must assure IFR obstruction clearance from the point at which the approach clearance is issued until established on a segment of a published route or instrument approach procedure.

5-123c(2) Note 2. — If the altitude assignment is VFR-on-top, it is conceivable that the pilot may elect to remain high until arrival over the final approach fix which may require the pilot to circle to descend so as to cross the final approach fix at an altitude that would permit landing.

d. Instructions to do one of the following:

5-123d Note. — The principal purpose of this paragraph is to ensure that frequency changes are made prior to passing the final approach fix. However, at times it will be desirable to retain an aircraft on the approach control frequency to provide a single-frequency approach or other radar services. When this occurs, it will be necessary to relay tower clearances or instructions to preclude changing frequencies prior to landing or approach termination.

(1) Monitor local control frequency, reporting to the tower when over the approach fix.

(2) Contact the tower on local control frequency.

5-123d(2) Reference. — Communications Release, 4-87.

(3) Contact the final controller on the appropriate frequency if radar service will be provided on final on a different frequency.

5-123d(3) Reference. — Final Controller Changeover, 5-137.

(4) When radar is used to establish the final approach fix, inform the pilot that after being advised that he is over the fix he is to contact the tower on local control frequency.

5-123d(4) Example. —

"Three miles from final approach fix. Turn left heading zero one zero. Maintain two thousand until established on the localizer. Cleared for I-L-S Runway Three Six Approach. I will advise when over the fix."

"Over final approach fix. Contact tower one one eight point one."

5-123d(4) Note. — ARSR may be used for establishment of initial approach and intermediate approach fixes only. ASR must be used to establish the final approach fix.

5-124 APPROACH SEPARATION RESPONSIBILITY

a. The radar controller performing the approach control function is responsible for separation of radar arrivals unless visual separation is provided by the tower, or a letter of agreement/facility directive authorizes otherwise. Radar final controllers ensure that established separation is maintained between aircraft under their control and other aircraft established on the same final approach course.

5-124a Note. — The radar controller may be a controller in an ARTCC, a terminal facility, or a tower controller when authorized to perform the approach control function in a terminal area.

5-124a Reference. — Visual Separation, 7-10; Radar Separation, 5-70; Wake Turbulence, 2-19, 5-72. Order 7210.3 — 212, Delegation of Radar Approach Control Authority to a Nonapproach Control Tower.

b. When timed approaches are being conducted, the radar controller shall maintain the radar separation specified in 6-64 until the aircraft is observed to have passed the final approach fix inbound and is within 5 miles of the runway on the final approach course or until visual separation can be provided by the tower.

5-125 PARALLEL ILS APPROACHES

TERMINAL

When conducting parallel ILS approaches:

a. Provide a minimum of 1,000 feet vertical or a minimum of 3 miles radar separation between aircraft during turn on.

b. Provide a minimum of 3 miles radar separation between aircraft on the same localizer course.

c. Provide a minimum of 2 miles radar separation between successive aircraft on adjacent localizer courses when the following conditions are met:

(1) Runway centerlines are at least 2,500 feet apart.

(2) Apply this separation standard only after aircraft are established on the localizers.

(3) Straight-in landings will be made.

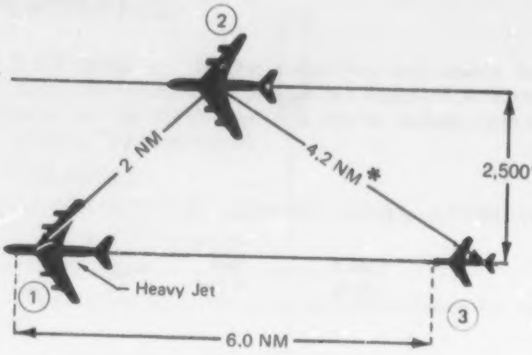
(4) Missed approach procedures do not conflict.

(5) Aircraft are informed that approaches to both runways are in use. This information may be provided through the ATIS.

(6) Approach control shall have the interphone capability of communicating directly with the local controller at locations where separation responsibility has not been delegated to the tower.

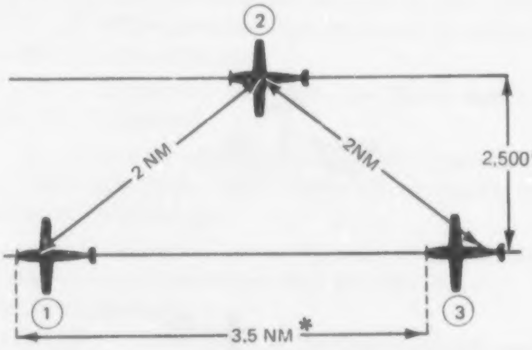
5-125c(6) Note. — The interphone capability is an integral part of this procedure when approach control has the sole separation responsibility.

5-125c(6) Reference. — Approach Separation Responsibility, 5-124; Order 7210.3 — 212, Delegation of Radar Approach Control Authority to a Nonapproach Control Tower.



5-125c Illustration 1

In this illustration, aircraft 2 is two miles from heavy aircraft 1. Aircraft 3 is a small aircraft and is six miles from aircraft 1. *The resultant separation between aircraft 2 and 3 is 4.2 miles.



5-125c Illustration 2

In this illustration, aircraft 2 is two miles from aircraft 1, and aircraft 3 is two miles from aircraft 2. *The resultant separation between aircraft 1 and 3 is more than 3.5 miles.

d. Consideration should be given to known factors that may in any way affect the safety of the instrument approach phase of flight, such as surface wind direction and velocity, wind shear alerts/reports, severe weather activity, etc. Closely monitor weather activity that could impact the final approach course. Weather conditions in the vicinity of the final approach course may dictate a change of approach in use.

5-126 SIMULTANEOUS ILS APPROACHES

TERMINAL

a. When parallel runways are at least 4,300 feet apart, authorize simultaneous ILS approaches to parallel runways if:

(1) Straight-in landings will be made.

(2) ILS, radar, and appropriate frequencies are operating normally.

b. Prior to aircraft departing an outer fix, inform aircraft that simultaneous ILS approaches are in use. This information may be provided through the ATIS.

c. On the initial vector, inform the aircraft of the ILS runway number and the localizer frequency.

Phraseology:

ILS RUNWAY (runway number) (left/right). LOCALIZER FREQUENCY IS (frequency).

d. Clear the aircraft to descend to the appropriate glide slope intercept altitude soon enough to provide a period of level flight to dissipate excess speed. Provide at least 1 mile of straight flight prior to localizer course intercept.

e. Vector the aircraft to intercept the final approach course at an angle not greater than 30 degrees.

f. Provide a minimum of 1,000 feet vertical or a minimum of 3 miles radar separation between aircraft during turn on to parallel localizer courses. Provide a minimum of 3 miles radar separation between aircraft on the same localizer course.

5-126f Note. — Aircraft established on a localizer course are separated from aircraft established on an adjacent parallel localizer course provided neither aircraft penetrates the depicted NTZ.

g. When assigning the final heading to intercept the localizer course, issue the following to the aircraft:

(1) Position from a fix on the localizer course.

(2) An altitude to maintain until established on the localizer course.

5-126g(2) Reference. — Arrival Instructions, 5-123.

(3) Clearance for the appropriate ILS runway number approach.

Phraseology:

POSITION (number) MILES FROM (fix). TURN (left/right) HEADING (degrees). MAINTAIN (altitude) UNTIL ESTABLISHED ON THE LOCALIZER. CLEARED FOR ILS RUNWAY (number)(left/right) APPROACH.

h. Monitor all approaches regardless of weather. Monitor local control frequency to receive any aircraft transmission. Issue control instructions and information necessary to ensure separation between aircraft and to ensure aircraft do not enter the "no transgression zone" (NTZ).

5-126h Note 1. — Separate monitor controllers, each with transmit/receive and override capability on local control frequency, shall ensure aircraft do not penetrate the depicted NTZ. Facility directives shall delineate responsibility for providing a minimum of 3 miles longitudinal separation between aircraft on the same localizer course.

5-126h Note 2. — An NTZ at least 2,000 feet wide is established equidistant between runway centerlines extended and is depicted on the monitor display. The primary responsibility for navigation on the localizer rests with the pilot. Therefore, control instructions and information are issued only to ensure separation between aircraft and that aircraft do not penetrate the NTZ. Pilots are not expected to acknowledge those transmissions unless specifically requested to do so.

5-126h Note 3. — For the purposes of ensuring an aircraft does not penetrate the NTZ, the "aircraft" is considered the center of the primary radar return for that aircraft. The provisions of 5-71 apply also.

(1) When aircraft are observed to overshoot the turn on or to continue on a track which will penetrate the NTZ, instruct the aircraft to return to the correct localizer immediately.

Phraseology:

YOU HAVE CROSSED THE LOCALIZER COURSE. TURN (left/right) IMMEDIATELY AND RETURN TO LOCALIZER COURSE,

or

TURN (left/right) AND RETURN TO LOCALIZER COURSE.

(2) When an aircraft is observed penetrating the NTZ, instruct aircraft on the adjacent localizer to alter course to avoid the deviating aircraft.

Phraseology:

TURN (left/right) HEADING (degrees) IMMEDIATELY, CLIMB AND MAINTAIN (altitude).

(3) Terminate radar monitoring when one of the following occurs:

(a) Visual separation is applied.

(b) The aircraft reports the approach lights or runway in sight.

(c) The aircraft is 1 mile or less from the runway threshold, if procedurally required and contained in facility directives.

(4) Do not inform the aircraft when radar monitoring is terminated.

(5) Do not apply the provisions of 5-180 for simultaneous ILS approaches.

i. When simultaneous ILS approaches are being conducted to parallel runways, consideration should be given to known factors that may in any way affect the safety of the instrument approach phase of flight, such as surface wind direction and velocity, wind shear alerts/reports, severe weather activity, etc. Closely monitor weather activity that could impact the final approach course. Weather conditions in the vicinity of the final approach course may dictate a change of approach in use.

5-127 thru 5-129 RESERVED

Section 10. RADAR APPROACHES — *TERMINAL*

5-130 APPLICATION

a. Provide radar approaches in accordance with standard or special instrument approach procedures.

b. A radar approach may be given to any aircraft upon request and may be offered to aircraft in distress regardless of weather conditions or to expedite traffic.

5-130b Note. — Acceptance of a radar approach by a pilot does not waive the prescribed weather minima for the airport or for the particular aircraft operator concerned. The pilot is responsible for determining if the approach and landing are authorized under the existing weather minima.

5-131 APPROACH INFORMATION

a. Issue the following information to an aircraft that will conduct a radar approach. Current approach information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS broadcast code. All items listed below, except for (3), may be omitted after the first approach if repeated approaches are made and no change has occurred.

5-131a Reference. — Approach Information by Approach Control Facilities, 4-72.

(1) Altimeter setting.

(2) Ceiling and visibility if ceiling at the airport of intended landing is reported below 1,000 feet, or below the highest circling minimum, whichever is greater, or if the visibility is less than 3 miles.

(3) Issue any known changes classified as special weather observations as soon as possible. Special weather observations need not be issued after they are included in the ATIS broadcast and the pilot states the appropriate ATIS broadcast code.

(4) Pertinent information on known airport conditions if they are considered necessary to the safe operation of the aircraft concerned.

(5) Lost communication procedures as specified in 5-133.

b. Before starting final approach:

5-131b Note 1. — ASR approach procedures may be prescribed for specific runways, for an airport/heliport, and for helicopters only to a "point-in-space," i.e., a MAP from which a helicopter must be able to proceed to the landing area by visual reference to a prescribed surface route.

5-131b Note 2. — Occasionally, copter PAR approaches are available to runways where conventional PAR approaches have been established. In those instances where the two PAR approaches serve the same runway, the copter approach will have a steeper glide slope and a lower decision height. By the controller's designating the approach to be flown, the helicopter pilot understands which of the two approaches he has been vectored for and which set of minima apply.

(1) Inform the aircraft of the type of approach, runway, airport, heliport, or other point, as appropriate, to which the approach will be made. Specify the airport name when the approach is to a secondary airport.

Phraseology:

THIS WILL BE A PAR/SURVEILLANCE APPROACH TO:

RUNWAY (runway number),

or

(airport name) AIRPORT, RUNWAY (runway number)

or

(airport name) AIRPORT/HELIPORT.

THIS WILL BE A COPTER PAR APPROACH TO:

RUNWAY (runway number),

or

(airport name) AIRPORT, RUNWAY (runway number),

or

(airport name) AIRPORT/HELIPORT.

(2) For surveillance approaches, specify the location of the MAP in relation to the runway/airport/heliport.

Phraseology:

MISSED APPROACH POINT IS (distance) MILE/S FROM RUNWAY/AIRPORT/HELIPORT,

or, for a Point-In-Space Approach

A MISSED APPROACH POINT (distance) MILE/S (direction from landing area) OF (airport name) AIRPORT/HELIPORT.

5-131b(1) and (2) Example. — Helicopter Point-in-Space Approach:

"Army Copter Zulu Two, this will be a surveillance approach to a missed approach point, three point five miles south of Creedon Heliport."

5-131b Reference. — Elevation failure, 5-168.

c. Inform an aircraft making an approach to an airport not served by a tower that no traffic or landing runway information is available for that airport.

Phraseology:

NO TRAFFIC OR LANDING RUNWAY INFORMATION AVAILABLE FOR THE AIRPORT.

5-132 NO-GYRO APPROACH

When an aircraft will make a no-gyro surveillance or PAR approach:

a. Before issuing a vector, inform the aircraft of the type of approach.

Phraseology:

THIS WILL BE A NO-GYRO SURVEILLANCE/PAR APPROACH.

b. Instruct the aircraft when to start and stop turn.

Phraseology:

TURN LEFT/RIGHT.

STOP TURN.

c. After turn on to final approach has been made and prior to the aircraft reaching the approach gate, instruct the aircraft to make half-standard rate turns.

Phraseology:

MAKE HALF-STANDARD RATE TURNS.

5-133 LOST COMMUNICATIONS

USA/USAF/USN NOT APPLICABLE

When weather reports indicate that an aircraft will likely encounter IFR weather conditions during the approach, take the following action as soon as possible after establishing radar identification and radio communications (may be omitted after the first approach when successive approaches are made and the instructions remain the same):

5-133 Note. — Where a military air traffic control facility provides radar approach control services for a civil airport, civilian aircraft will be given specific lost communications procedures when lost communications instructions are required.

a. If lost communications instructions will require the aircraft to fly on an unpublished route, issue an appropriate altitude to the pilot. If the lost communications instructions are the same for both pattern and final, the pattern/vector controller shall issue both. Advise the pilot that if radio communications are lost for a specified time interval (not more than 1 minute) on vector to final approach, 15 seconds on a surveillance final approach, or 5 seconds on a PAR final approach to:

(1) Attempt contact on a secondary, or tower frequency.

(2) Proceed in accordance with visual flight rules, if possible.

(3) Proceed with an approved nonradar approach, or execute the specific lost communications procedure for the radar approach being used.

5-133a(3) Note. — The approved procedures are those published on the FAA Forms 8260 or applicable military document.

Phraseology:

IF NO TRANSMISSIONS ARE RECEIVED FOR (time interval) IN THE PATTERN OR FIVE/FIFTEEN SECONDS ON FINAL APPROACH, ATTEMPT CONTACT ON (frequency), AND

if possibility exists,

PROCEED VFR. IF UNABLE:

if approved,

PROCEED WITH (nonradar approach), MAINTAIN (altitude) UNTIL ESTABLISHED ON/OVER/FIX/NAVAID/APPROACH PROCEDURE,

or

(alternative instructions).

USN

Phraseology:

(For ACLS operations using Mode I, IA, and II). IF NO TRANSMISSIONS ARE RECEIVED FOR FIVE SECONDS AFTER LOSS OF DATA LINK, ATTEMPT CONTACT ON (frequency), AND

if possibility exists,

PROCEED VFR. IF UNABLE:

if approved,

PROCEED WITH (nonradar approach), MAINTAIN (altitude) UNTIL ESTABLISHED ON/OVER FIX/NAVAID/APPROACH PROCEDURE,

or

(alternative instructions).

b. If the final approach lost communications instructions are changed, differ from those for the pattern, or are not issued by the pattern controller, they shall be issued by the final controller.

c. If the pilot states that he cannot accept a lost communications procedure due to weather conditions or other reasons, request the pilot's intention.

5-133c Note. — The pilot is responsible for determining the adequacy of lost communications procedures with respect to aircraft performance, equipment capability, or reported weather.

5-134 RADAR CONTACT LOST

If radar contact is lost during an approach and the aircraft has not started final approach, clear the aircraft to an appropriate NAVAID/fix for an instrument approach.

5-135 LANDING CHECK

USA/USN

Advise the pilot to perform landing check while the aircraft is on downwind leg and in time to complete it before turning base leg. If an incomplete pattern is used, issue this before handoff to the final controller for a PAR approach, or before starting descent on final approach for surveillance approach.

Phraseology:

PERFORM LANDING CHECK

5-136 POSITION INFORMATION

Inform the aircraft of its position at least once before starting final approach.

Phraseology:

(Number) MILES (direction) OF AIRPORT,

or

DOWNWIND/BASE LEG (number) MILES (direction) OF AIRPORT.

5-137 FINAL CONTROLLER CHANGEOVER

When instructing the aircraft to change frequency for final approach guidance, include the name of the facility.

Phraseology:

CONTACT (name of facility) FINAL CONTROLLER ON (frequency).

5-138 COMMUNICATIONS CHECK

On initial contact with the final controller, ask the aircraft for a communication check.

Phraseology:

(Aircraft call sign), (name of facility) FINAL CONTROLLER.

HOW DO YOU HEAR ME?

5-139 TRANSMISSION ACKNOWLEDGMENT

After contact has been established with the final controller and while on the final approach course, instruct the aircraft not to acknowledge further transmissions.

Phraseology:

DO NOT ACKNOWLEDGE FURTHER TRANSMISSIONS.

5-140 WHEELS DOWN CHECK

USA/USAF/USN

Before the aircraft starts descent on final approach, remind the pilot that wheels should be down unless he has previously reported wheels down.

Phraseology:

WHEELS SHOULD BE DOWN.

5-140 Note. — The intent is solely to remind the pilot to lower the wheels; not to place responsibility on the controller.

5-141 MISSED APPROACH

USAF NOT APPLICABLE

Before an aircraft starts final descent for a full stop landing and weather reports indicate that any portion of the final approach will be conducted in IFR conditions, issue a specific missed approach procedure approved for the radar approach being conducted.

Phraseology:

YOUR MISSED APPROACH PROCEDURE IS (missed approach procedure).

5-141 Note. — The specific missed approach procedure is published on FAA Form 8260-4 or applicable military document.

5-142 LOW APPROACH AND TOUCH-AND-GO

Before an aircraft which plans to execute a low approach or touch-and-go begins final descent, issue appropriate departure instructions to be followed upon completion of the approach. Climb-out instructions must include a specific heading and altitude except when the aircraft will maintain VFR and contact the tower.

Phraseology:

AFTER COMPLETING LOW APPROACH/

TOUCH AND GO:

CLIMB AND MAINTAIN (altitude).

TURN (right or left) HEADING (degrees)/FLY RUNWAY HEADING,

or

MAINTAIN VFR, CONTACT TOWER,

or

(other instructions as appropriate).

5-142 Note. — This may be omitted after the first approach if instructions remain the same.

5-143 TOWER CLEARANCE

a. When an aircraft is on final approach to an airport served by a tower, obtain a clearance to land, touch-and-go, or make low approach. Issue the clearance and the surface wind to the aircraft.

b. If the clearance is not obtained or is cancelled, inform the aircraft and issue alternative instructions.

Phraseology:

TOWER CLEARANCE CANCELLED/NOT RECEIVED (alternative instructions).

5-144 FINAL APPROACH ABNORMALITIES

Instruct the aircraft if runway environment not in sight, execute a missed approach if previously given; or climb to or maintain a specified altitude and fly a specified course whenever the completion of a safe approach is questionable because one or more of the following conditions exists. The conditions in a., b., and c., below do not apply after the aircraft passes decision height on a PAR approach.

5-144 Examples —

Examples of reasons for issuing missed approach instructions:

"Radar contact lost."

"Too high/low for safe approach."

"Too far right/left for safe approach."

5-144 Reference. — Position Advisories, 5-166.

a. Safety limits are exceeded or radical target deviations are observed.

b. Position or identification of the aircraft is in doubt.

c. Radar contact is lost or a malfunctioning radar is suspected.

Phraseology:

(Reason) IF RUNWAY/APPROACH LIGHTS/ RUNWAY LIGHTS NOT IN SIGHT, EXECUTE MISSED APPROACH/(alternative instructions).

5-144c Note. — If the pilot requests, approval may be granted to proceed with the approach via ILS or other navigational aid.

5-144c Reference. — Radar Contact Lost, 5-134.

d. Airport conditions or traffic preclude approach completion.

Phraseology:

EXECUTE MISSED APPROACH/(alternative instructions). (Reason).

5-145 thru 5-149 RESERVED

Section 11. SURVEILLANCE APPROACHES — *TERMINAL*

5-150 ALTITUDE INFORMATION

Provide recommended altitudes on final approach if the pilot requests. If recommended altitudes are requested, inform the pilot that recommended altitudes which are at or above the published MDA will be given for each mile on final.

5-150 Reference. — Facility managers refer to Order 7210.3 — 1246, Recommended Altitudes for Surveillance Approaches.

5-151 VISUAL REFERENCE REPORT

Aircraft may be requested to report the runway, approach/runway lights, or airport in sight. Helicopters making a "point-in-space" approach may be requested to report when able to proceed to the landing area by visual reference to a prescribed surface route.

Phraseology:

REPORT (runway, approach/runway lights or airport) IN SIGHT.

REPORT WHEN ABLE TO PROCEED VISUALLY TO AIRPORT/HELIPORT.

5-152 DESCENT NOTIFICATION

a. Issue advance notice of where descent will begin and issue the straight-in MDA prior to issuing final descent for the approaches.

5-152a Note. — The point at which descent to the minimum descent altitude is authorized is the final approach fix unless an altitude limiting stepdown-fix is prescribed.

b. When it is determined that the surveillance approach will terminate in a circle to land maneuver, request the aircraft approach category from the pilot. After receiving the aircraft approach category, provide him with the applicable circling MDA prior to issuing final descent for the approach.

5-152b Note. — Pilots are normally expected to furnish the aircraft approach category to the controller when it is determined that the surveillance approach will terminate in a circle to land maneuver. If this information is not voluntarily given, solicit the aircraft approach category from the pilot and then issue him the applicable circling MDA.

Phraseology:

PREPARE TO DESCEND IN (number) MILE/S.

For straight-in approaches

PUBLISHED MINIMUM DESCENT ALTITUDE (altitude).

For circling Approaches

REQUEST YOUR AIRCRAFT APPROACH CATEGORY. (Upon receipt of aircraft approach category), PUBLISHED CIRCLING MINIMUM DESCENT ALTITUDE (altitude).

5-153 DESCENT INSTRUCTIONS

When an aircraft reaches the descent point, issue one of the following, as appropriate:

5-153 Reference. — Elevation Failure, 5-168.

a. Unless a descent restriction exists, advise the aircraft to descend to the MDA.

Phraseology:

(Number) MILES FROM RUNWAY/AIRPORT/HELIPORT. DESCEND TO YOUR MINIMUM DESCENT ALTITUDE.

b. When a descent restriction exists, specify the prescribed restriction altitude. When the aircraft has passed the altitude limiting point, advise to continue descent to MDA.

Phraseology:

(Number) MILES FROM RUNWAY/AIRPORT/HELIPORT. DESCEND AND MAINTAIN (restriction altitude).

DESCEND TO YOUR MINIMUM DESCENT ALTITUDE.

5-154 FINAL APPROACH GUIDANCE

a. Issue course guidance, inform the aircraft when it is on-course, and frequently inform the aircraft of any deviation from course.

Phraseology:

HEADING (heading),

ON-COURSE,

or

SLIGHTLY/WELL LEFT/RIGHT OF COURSE.

5-154a Note. — Controllers should not key the radio transmitter continuously during radar approaches to preclude a lengthy communications block. The decision on how often transmitters are unkeyed is the controller's prerogative.

b. Issue trend information, as required, to indicate target position with respect to the extended runway centerline and to describe the target movement as appropriate corrections are issued. Trend information may be modified by the terms "RAPIDLY" AND "SLOWLY", as appropriate.

5-154b Examples. —

"Going left/right of course." "Left/right of course and holding/correcting."

c. Inform the aircraft of its distance from the runway, airport/heliport or MAP, as appropriate, each mile on final.

Phraseology:

(Number) MILE/S FROM RUNWAY/AIRPORT/HELIPORT OR MISSED APPROACH POINT.

d. Recommended altitudes shall be furnished, if requested, in accordance with 5-150.

Phraseology:

If requested,

ALTITUDE SHOULD BE (altitude).

5-155 APPROACH GUIDANCE TERMINATION

a. Discontinue surveillance approach guidance when:

(1) Requested by the pilot.

(2) In your opinion, continuation of a safe approach to the MAP is questionable.

(3) The aircraft is over the MAP.

b. *USAF NOT APPLICABLE:* Surveillance approach guidance may be discontinued when the pilot reports the runway or approach/runway lights in sight or if a "point-in-space" approach, he reports able to proceed to the landing area by visual reference to a prescribed surface route.

c. When approach guidance is discontinued in accordance with a. above and the aircraft has reported the runway or approach/runway lights in sight, advise the aircraft of its position and to proceed visually.

Phraseology:

(Distance) MILE/S FROM RUNWAY/AIRPORT/HELIPORT

or

OVER MISSED APPROACH POINT.

PROCEED VISUALLY (additional instructions/clearance as required).

d. When approach guidance is discontinued in accordance with a. above and the aircraft has not reported the runway or approach/runway lights in sight, advise the aircraft of its position and to execute a missed approach unless the runway or approach/runway lights are in sight or, if a "point-in-space" approach, unless able to proceed visually.

Phraseology:

(Distance) MILE/S FROM RUNWAY,

or

OVER MISSED APPROACH POINT.

IF RUNWAY,

or

APPROACH/RUNWAY LIGHTS NOT IN SIGHT, EXECUTE MISSED APPROACH/(missed approach instructions). (Additional instructions/clearance, as required).

(Distance and direction) FROM AIRPORT/HELIPORT/MISSED APPROACH POINT.

IF UNABLE TO PROCEED VISUALLY, EXECUTE MISSED APPROACH. (Additional instructions/clearance, if required).

5-155d Note. — Terminal Instrument Approach Procedures and Flight Inspection criteria require establishment of a MAP for each procedure including the point to which satisfactory radar guidance can be provided.

5-156 thru 5-159 RESERVED

Section 12. PAR APPROACHES — *TERMINAL*

5-160 GLIDEPATH NOTIFICATION

Inform the aircraft when it is approaching glidepath (approximately 10 to 30 seconds before final descent).

Phraseology:

APPROACHING GLIDEPATH.

5-161 DECISION HEIGHT (DH) NOTIFICATION

Provide the DH to any pilot who requests it.

Phraseology:

PUBLISHED DECISION HEIGHT (number of feet).

5-162 DESCENT INSTRUCTION

When an aircraft reaches the point where final descent is to start, instruct it to begin descent.

Phraseology:

BEGIN DESCENT.

5-163 GLIDEPATH AND COURSE INFORMATION

a. Issue course guidance and inform the aircraft when it is on glidepath and on course, and frequently inform the aircraft of any deviation from glidepath or course.

Phraseology:

HEADING (heading).

ON GLIDEPATH.

ON COURSE,

or

SLIGHTLY/WELL ABOVE/BELOW GLIDEPATH.

SLIGHTLY/WELL LEFT/RIGHT OF COURSE.

5-163a Note. — Controllers should not key the radio transmitter continuously during radar approaches to preclude a lengthy communications block. The decision on how often transmitters are unkeyed is the controller's prerogative.

b. Issue trend information as required, to indicate target position with respect to the azimuth and elevation cursors and to describe target movement as appropriate corrections are issued. Trend information may be modified by the terms "RAPIDLY or "SLOWLY", as appropriate.

5-163b Examples. —

"Going above/below glidepath."

"Going right/left of course."

"Above/below glidepath and coming down/up."

"Above/below glidepath and holding."

"Left/right of course and holding/correcting."

5-164 DISTANCE FROM TOUCHDOWN

Inform the aircraft of its distance from touchdown at least once each mile on final approach.

Phraseology:

(Number of miles) MILES FROM TOUCHDOWN.

5-165 DECISION HEIGHT

Inform the aircraft when it reaches the published decision height.

Phraseology:

AT DECISION HEIGHT.

5-166 POSITION ADVISORIES

a. Continue to provide glidepath and course information prescribed in 5-163a. and b. until the aircraft passes over threshold.

5-166 Note. — Glidepath and course information provided below decision height is advisory only. FAR 91.117 outlines pilot responsibilities for descent below decision height.

b. Inform the aircraft when it is passing over the approach lights.

Phraseology:

OVER APPROACH LIGHTS.

c. Inform the aircraft when it is passing over the landing threshold and inform it of its position with respect to the final approach course.

Phraseology:

OVER LANDING THRESHOLD, (position with respect to course).

5-167 COMMUNICATION TRANSFER

Issue communications transfer instructions.

Phraseology:

CONTACT (terminal control function) (frequency, if required) AFTER LANDING.

5-167 Note. — Communications transfer instructions should be delayed slightly until the aircraft is on the landing roll-out to preclude diversion of the pilot's attention during transition and touchdown.

5-167 Reference. — Radio Communications Transfer, 2-17.

5-168 ELEVATION FAILURE

a. If the elevation portion of PAR equipment fails during a precision approach:

(1) Discontinue PAR instructions and tell the aircraft to take over visually or, if unable, to execute a missed approach. If the aircraft executes a missed approach, apply (2) below.

Phraseology:

NO GLIDEPATH INFORMATION AVAILABLE. IF RUNWAY, APPROACH/RUNWAY LIGHTS NOT IN SIGHT, EXECUTE MISSED APPROACH/(alternative instructions).

(2) If a surveillance approach, ASR or PAR without glide slope, is established for the same runway, inform the aircraft that a surveillance approach can be given. Use ASR or the azimuth portion of the PAR to conduct the approach and apply Section 11 of this chapter. When the PAR azimuth is used, inform the pilot that mileage information will be from touchdown and at those runways where specific minima have been established for PAR without glide slope. Inform the pilot that the PAR azimuth will be used for the approach.

5-168a(2) Examples. —

a. Approach information when PAR azimuth used:

"This will be a surveillance approach to Runway Three Six. Mileages will be from touchdown," or

"This will be a surveillance approach to Runway Three Six using PAR azimuth. Mileages will be from touchdown."

b. Descent instructions:

"Five miles from touchdown, descend to your minimum descent altitude/minimum altitude."

5-168a(2) Reference. — Approach Information 5-131; Descent Instructions, 5-153.

b. If the elevation portion of the PAR equipment is inoperative before starting a precision approach, apply a. (2) above.

5-169 SURVEILLANCE UNUSABLE

PAR approaches may be conducted when the ASR is unusable provided a nonradar instrument approach will position the aircraft over a navigational aid or DME fix within the precision radar coverage, or an adjacent radar facility can provide a direct radar handoff to the PAR controller.

5-169 Note. — The display of the NAVAID or DME fix in accordance with 5-51b. is not required provided the NAVAID or DME fix can be correlated on a PAR scope.

5-170 thru 5-179 RESERVED

Section 13. USE OF PAR FOR APPROACH MONITORING — *TERMINAL*

5-180 MONITOR ON PAR EQUIPMENT

Aircraft conducting precision or nonprecision approaches shall be monitored by PAR equipment if the PAR final approach course coincides with the NAVAID final approach course from the final approach fix to the runway and one of the following conditions exists:

5-180 Note 1. — The provisions of this Section do not apply to monitoring simultaneous ILS Approaches.

5-180 Note 2. — This procedure is used in PAR facilities operated by the FAA and the military services at joint-use civil/military locations and military installations during the operational hours of the PAR.

a. The reported weather is below basic VFR minima. *(USAF:* When reported weather is below 1,500 feet or 3 miles.)

b. *USA NOT APPLICABLE.* At night.

c. Upon request of the pilot.

5-181 MONITOR AVAILABILITY

a. Inform the aircraft of the frequency on which monitoring information will be transmitted if it will not be the same as the communication frequency used for the approach.

Phraseology:

RADAR MONITORING ON LOCALIZER VOICE (frequency),

and, if applicable

CONTACT (terminal control function) (frequency, if required) AFTER LANDING.

b. If the approach is not monitored, inform the aircraft that radar monitoring is not available.

Phraseology:

RADAR MONITORING NOT AVAILABLE.

c. If conditions prevent continued monitor after the aircraft is on final approach, advise the pilot. State the reason and issue alternate procedures as appropriate.

Phraseology:

(Reason), RADAR MONITORING NOT AVAILABLE, (alternative instructions).

5-181c Note. — Approach monitoring is a vital service, but during the approach, the controller acts primarily as a safety observer and does not actually guide the aircraft. Loss of the radar monitoring capability (and thus availability) is no reason to terminate an otherwise good instrument approach. Advise the pilot that radar contact has been lost (or other reason as appropriate), that radar monitoring is not available, and of actions for the pilot to take in either proceeding with or breaking off the approach; i.e., contact tower, remain on PAR frequency, etc.

5-182 MONITOR INFORMATION

When approaches are monitored, take the following action:

a. Advise the pilot executing a nonprecision approach that glidepath advisories are not provided. Do this prior to the pilot beginning his final descent.

Phraseology:

GLIDEPATH ADVISORIES WILL NOT BE PROVIDED.

b. Inform the aircraft when passing final approach fix.

Phraseology:

PASSING (fix).

c. Advise the pilot of glidepath trend information (precision approaches) and course trend information to indicate target position and movement with respect to the elevation or azimuth cursor when the aircraft target corresponds to a position of well above/below the glidepath or well left/right of course and whenever the aircraft exceeds the radar safety limits. Repeat if no correction is observed.

5-182c Examples. —

Course trend information: "(Ident), well right/left of PAR course, drifting further right/left."

Glidepath trend information: "(Ident), well above/below PAR glidepath."

5-182c Reference. — Glidepath and Course Information, 5-163b.

d. If, after repeated advisories, the aircraft is observed proceeding outside the safety limits or a radical target deviation is observed, advise the aircraft if unable to proceed visually, execute a missed approach. Issue a specific altitude and heading if a procedure other than the published missed approach is to be executed.

Phraseology:

(Position with respect to course or glidepath). IF NOT VISUAL, ADVISE YOU EXECUTE MISSED APPROACH (alternative instructions).

e. Provide monitor information until the aircraft is over the landing threshold or commences a circling approach.

5-183 WHEELS DOWN CHECK

USA/USAF/USN

Before the aircraft starts descent on final approach, remind the pilot that wheels should be down unless he has previously reported wheels down.

Phraseology:

WHEELS SHOULD BE DOWN.

5-183 Note. — The intent is solely to remind the pilot to lower the wheels; not to place responsibility on the controller.

5-184 thru 5-189 RESERVED

Section 14. AUTOMATION — *EN ROUTE*

5-190 CONFLICT ALERT

a. When a conflict alert is displayed, evaluate the reason for the alert without delay and take appropriate action.

5-190a Reference. — Safety Advisory, 2-6.

b. If another controller is involved in the alert, initiate coordination to ensure an effective course of action. Coordination is not required when immediate action is dictated.

c. Suppressing/Inhibiting Conflict Alert.

(1) The controller may suppress the display of a Conflict Alert from a control position with the application of one of the following suppress/inhibit computer functions:

(a) The Conflict Suppress (CO) function may be used to suppress the CA display between specific aircraft for a specific alert.

(b) The Group Suppression (GS) function shall be applied exclusively to inhibit the displaying of alerts among military aircraft engaged in special military operations where standard en route separation criteria do not apply.

5-190c(1) Note. — Special military operations where the GS function would typically apply involve those activities where military aircraft routinely operate in proximities to each other that are less than standard en route separation criteria (i.e., air refueling operations, ADC practice intercept operations.)

(2) Computer entry of a message suppressing a Conflict Alert constitutes acknowledgment for the alert and signifies that appropriate action has or will be taken.

(3) Conflict Alert may not be suppressed or inhibited at or for another control position without being coordinated.

5-191 EN ROUTE MINIMUM SAFE ALTITUDE WARNING (E-MSAW)

a. When an E-MSAW alert is displayed, immediately analyze the situation and, if necessary, take the appropriate action to resolve the alert.

5-191a Note. — Caution should be exercised when issuing a clearance to an aircraft in reaction to an E-MSAW alert to ensure that adjacent MIA areas are not a factor.

5-191a Reference. — Safety Advisory, 2-6.

b. The controller may suppress the display of an E-MSAW alert from his control position with the application of one of the following suppress/inhibit computer functions:

(1) The Specific Alert Suppression message may be used to inhibit the E-MSAW alerting display on a single flight for a specific alert.

(2) The Indefinite Alert Suppression message shall be used exclusively to inhibit the display of E-MSAW alerts on aircraft known to be flying at an altitude that will activate the alert feature of one or more MIA areas within an ARTCC.

5-191b(2) Note 1. — The Indefinite Suppression message will remain in effect for the duration of the referenced flight's active status within the ARTCC unless modified by controller action.

5-191b(2) Note 2. — The Indefinite Suppression message would typically apply to military flights with clearance to fly low-level type routes that routinely require altitudes below established minimum IFR altitudes.

c. Computer entry of a message suppressing or inhibiting E-MSAW alerts constitutes acknowledgment for the alert and indicates that appropriate action has or will be taken to resolve the situation.

5-192 COMPUTER ENTRY OF ASSIGNED ALTITUDE

The data block shall always reflect the current status of the aircraft, unless otherwise specified in a facility directive. Whenever an aircraft is cleared to maintain an altitude different from that in the flight plan data base, enter into the computer one of the following:

5-192 Note. — A facility directive may be published deleting the interim altitude computer entry requirements of 5-192b. The directive would apply to those conditions where heavy traffic or sector complexity preclude meeting these entry requirements.

5-192 Reference. — Order 7210.3-1025, Waiver of Interim Altitude Requirements.

a. The new assigned altitude if the aircraft will (climb or descend to and) maintain the new altitude, or

b. An interim altitude if the aircraft will (climb or descend to and) maintain the new altitude for a short period of time and subsequently be recleared to the altitude in the flight plan data base or a new altitude or a new interim altitude.

5-192b Note. — Use of the interim altitude function will ensure that the data block reflects the actual status of the aircraft and eliminate superfluous altitude updates.

5-193 ENTRY OF REPORTED ALTITUDE

Except in EARTS, whenever Mode C altitude information is either not available or is unreliable, enter reported altitudes into the computer as follows:

5-193 Note. — Altitude updates are required to assure maximum accuracy in applying slant range correction formulas.

a. When an aircraft reaches the assigned altitude.

b. When an aircraft at an assigned altitude is issued a clearance to climb or descend.

c. A minimum of each 10,000 feet during climb to or descent from FL 180 and above.

5-194 SELECTED ALTITUDE LIMITS

To ensure the display of Mode C targets and data blocks, take the following actions:

5-194 Note. — Exception to these requirements may be authorized for specific altitudes in certain center sectors if defined in appropriate facility directives and approved by the Regional AT Division Manager.

a. NAS En route Stage A:

(1) Display altitude limits in the "R" CRD to include, as a minimum, the altitude stratum of the sector, and

(2) Select the display filter keys on the PVD that include, as a minimum, the altitude stratum of the sector plus:

(a) 1,200 feet above the highest and below the lowest altitude or flight level of the sector where 1,000 feet vertical separation is applicable, and

(b) 2,200 feet above the highest and below the lowest flight level of the sector where, 2,000 feet vertical separation is applicable.

b. En route Automated Radar Tracking System (EARTS). Select altitude filter limits to include, as a minimum, the altitude stratum of the sector display.

c. Direct Access Radar Channel (DARC):

(1) Display altitude limits on the PVD to include, as a minimum, the altitude stratum of the sector, and

(2) Select the display filter keys on the PVD that include, as a minimum, the altitude stratum of the sector plus:

(a) 1,200 feet above the highest and below the lowest altitude or flight level of the sector where 1,000 feet vertical separation is applicable, and

(b) 2,200 feet above the highest and below the lowest flight level of the sector where 2,000 feet vertical separation is applicable.

5-195 SECTOR ELIGIBILITY

The use of the OK function is allowed to override sector eligibility only when one of the following conditions is met:

a. Prior coordination is effected.

b. The flight is within the control jurisdiction of the sector.

5-196 COAST TRACKS

Do not use coast tracks in the application of either radar or nonradar separation criteria.

5-197 CONTROLLER INITIATED COAST TRACKS

a. Initiate coast tracks only in Flight Plan Aided Tracking (FLAT) mode, except "free" coast tracking may be used as a reminder that aircraft without corresponding computer stored flight plan information are under your control.

5-197a Note. — To ensure tracks are started in FLAT mode, perform a start track function at the aircraft's most current reported position, then immediately "force" the track into coast tracking by performing another start function with "CT" option in field 64. Making amendments to the stored route with trackball entry when the aircraft is rerouted, and repositioning the data block to coincide with the aircraft's position reports are methods of maintaining a coast track in FLAT mode.

b. Prior to initiating a coast track, ensure the following:

(1) A departure message or progress report corresponding with aircraft's current position is entered into the computer.

(2) The track being started is within Posted Time Update Interval (PTUI) of the aircraft's computer-estimated position and Flight Plan Track Position Difference (FTPD) distance of the aircraft's flight plan route.

5-197b(2) Note. — FTPD is an automation parameter, normally set to 15 miles, that is compared with the tracked target's perpendicular distance from the stored flight plan route. If the track is within the parameter miles, it is eligible for "FLAT Tracking." PTUI is an automation parameter, normally set to 3 minutes, that is compared against the difference between the calculated time of arrival and the actual time of arrival over a fix. If the difference is greater than PTUI, the flight plan's stored data will be revised and fix-time update messages will be generated.

c. As soon as practicable after the aircraft is in radar surveillance, initiate action to cause radar tracking to begin on the aircraft.

5-198 thru 5-209 RESERVED

Section 15. AUTOMATED RADAR TERMINAL SYSTEMS (ARTS) — *TERMINAL*

5-210 APPLICATION

ARTS may be used for identifying aircraft assigned a discrete beacon code, maintaining identity of targets, and performing handoffs of these targets between controllers.

5-210 Note. — *USAF/USN:* Where PIDP/DAIR equipment is capable of performing the functions described in this section, it may be used accordingly.

5-211 RESPONSIBILITY

This equipment does not relieve the controller of the responsibility to ensure proper identification, maintenance of identity, handoff of the correct target associated with the alphanumeric data, and separation of aircraft.

5-212 FUNCTIONAL USE

In addition to other uses specified herein, terminal automation may be used for the following functions:

a. Tracking (ARTS III and IIIA).

b. Tagging (ARTS II).

c. Handoff (ARTS II, III, and IIIA).

d. Altitude information (ARTS II, III, and IIIA).

e. Coordination (ARTS II, III, and IIIA).

f. Ground speed (ARTS III and IIIA).

g. Identification.

5-213 SYSTEM REQUIREMENTS

Use the ARTS systems as follows:

5-213 Note. — Locally developed procedures, operating instructions, and training material are required because of differences in equipment capability. Such locally developed procedures shall be supplemental to those contained in this section and shall be designed to make maximum use of the ARTS equipment.

a. Inform all appropriate positions before terminating or reinstating use of the ARTS system at a control position. When terminating the use of ARTS, all pertinent flight data of that position shall be transferred or terminated.

b. Inform other interfaced facilities of scheduled and unscheduled shutdowns.

c. Initiate a track/tag on all aircraft to the maximum extent possible. As a minimum, aircraft identification should be entered and automated handoff functions should be used.

d. Assigned altitude, if displayed, shall be kept current at all times. Climb and descent arrows, where available, shall be used to indicate other than level flight.

e. Do not use the automatic altitude readout of an aircraft under another controller's jurisdiction for vertical separation purposes without verbal coordination.

5-214 INFORMATION DISPLAYED

a. Two-letter ICAO designators or three letter designators, as appropriate, shall be used unless program limitations dictate the use of a single letter alpha prefix.

b. Use of the inhibit select switches to remove displayed information no longer required shall be in accordance with local directives which should ensure maximum required use of the equipment.

c. Information displayed in the ATIS, General Information, and Scratch Pad areas shall be in accordance with local directives.

5-215 CONFLICT ALERT

a. When a conflict alert is displayed, evaluate the reason for the alert without delay and take appropriate action.

5-215a Reference. — Safety Advisory, 2-6.

b. If another controller is involved in the alert, initiate coordination to ensure an effective course of action. Coordination is not required when immediate action is dictated.

c. Suppressing/Inhibiting Conflict Alert.

(1) The suppress function may be used to suppress the display of a specific Conflict Alert.

(2) The inhibit function shall only be used to inhibit the display of Conflict Alert for aircraft routinely engaged in operations where standard separation criteria do not apply.

5-215c(2)(b) Note. — Examples of operations where standard separation criteria do not apply are ADC practice intercept operations and air shows.

(3) Computer entry of a message suppressing a Conflict Alert constitutes acknowledgment for the alert and signifies that appropriate action has or will be taken.

(4) Conflict Alert may not be suppressed or inhibited at or for another control position without being coordinated.

5-216 INHIBITING MINIMUM SAFE ALTITUDE WARNING (MSAW)

a. Assign a beacon code to VFR aircraft to inhibit MSAW processing unless the aircraft has specifically requested MSAW. Inhibit MSAW processing for an aircraft which has cancelled its IFR

flight plan but has not requested MSAW processing.

b. A low altitude alert may be suppressed from the control position. Computer entry of the suppress message constitutes an acknowledgment for the alert and indicates that appropriate action has or will be taken.

5-217 TRACK SUSPEND FUNCTION

Use the track suspend function only when data block overlap in holding patterns or in proximity of the final approach create an unworkable situation. If necessary to suspend tracks, those which are not displaying automatic altitude readouts shall be suspended. If the condition still exists, those displaying automatic altitude readouts may then be suspended.

5-218 thru 5-219 RESERVED

Section 16. TPX-42 — *TERMINAL*

5-220 APPLICATION

Each TPX-42 facility shall utilize the equipment to the maximum extent possible consistent with local operating conditions.

5-221 RESPONSIBILITY

This equipment does not relieve the controller of the responsibility to ensure proper identification, maintenance of identity, hand-off of the correct radar beacon target associated with numeric data, and the separation of aircraft.

5-222 FUNCTIONAL USE

TPX-42 may be used for the following functions:

a. Tagging.

b. Altitude information.

c. Coordination.

d. Target identity confirmation.

5-223 SYSTEM REQUIREMENTS

Use the TPX-42 system as follows:

a. TPX-42 facilities shall inform adjacent facilities of scheduled and unscheduled shutdowns.

b. To the maximum extent practicable, tags should be utilized for all controlled aircraft.

5-224 INFORMATION DISPLAYED

a. Inhibiting portions of the tag shall be in accordance with facility directives which shall ensure maximum required use of the equipment.

b. Mode C altitude information shall not be inhibited unless a ground malfunction causes repeated discrepancies of 300 feet or more between the automatic altitude readouts and pilot reported altitudes.

5-225 ALTITUDE FILTERS

Set altitude filters to display Mode C within each controller's area of responsibility by setting the altitude limits to encompass all altitudes under the controller's jurisdiction. Set upper limits no lower than 1,000 feet above the highest altitude for which the controller is responsible. Lower limits normally should encompass field elevation so that provisions of 2-6 and 5-37b.(3) may be applied. Air traffic managers may authorize temporary suspension of this requirement when clutter is excessive.

5-226 INHIBITING LOW ALTITUDE ALERT SYSTEM (LAAS)

Assign a beacon code to a VFR aircraft or to an aircraft that has canceled its IFR flight plan to inhibit LAAS processing unless the aircraft has specifically requested LAAS.

TABLE OF CONTENTS

Page

Chapter 6. NON-RADAR

Section 1. GENERAL

6-1 DME 6-1
6-2 Nonreceipt of Position Report 6-1
6-3 Duplicate Position Reports 6-1
6-4 Adjacent Airport Operation 6-1
6-5 Arrival Minima 6-1
6-6—6-9 Reserved 6-1

Section 2. INITIAL SEPARATION OF SUCCESSIVE DEPARTING AIRCRAFT

● 6-10 Minima on Diverging Courses 6-2
6-11 Minima on Same Course 6-3
6-12—6-19 Reserved 6-3

Section 3. INITIAL SEPARATION OF DEPARTING AND ARRIVING AIRCRAFT

6-20 Separation Minima 6-4
6-21—6-29 Reserved 6-4

Section 4. LONGITUDINAL SEPARATION

6-30 Application 6-5
6-31 Minima on Same, Converging, or Crossing Courses 6-5
6-32 Minima on Opposite Courses 6-7
6-33 Separation by Pilots 6-8
6-34 RNAV Aircraft Along VOR Airways/Routes 6-8
6-35—6-39 Reserved 6-8

Section 5. LATERAL SEPARATION

6-40 Separation Methods 6-9
6-41 Minima on Diverging Radials 6-9
6-42 DME Arc Minima 6-9
6-43 Minima Along Other Than Established Airways or Routes 6-10
6-44 RNAV Minima — Diverging/Crossing Courses 6-11
6-45—6-49 Reserved 6-11

Section 6. VERTICAL SEPARATION

6-50 Application 6-12
6-51 Minima Between Altitudes 6-12
6-52 Exceptions 6-12
6-53 Separation by Pilots 6-12
6-54—6-59 Reserved 6-12

Section 7. TIMED APPROACHES

6-60 Application 6-13
6-61 Approach Sequence 6-13
6-62 Sequence Interruption 6-14
6-63 Level Flight Restriction 6-14
6-64 Interval Minima 6-14
6-65 Time Check 6-14
6-66 Missed Approaches 6-14

Chapter 6. NON-RADAR

Section 1. GENERAL

6-1 DME

Use DME procedures and minima only when direct pilot-controller communications are maintained.

6-2 NONRECEIPT OF POSITION REPORT

When a position report affecting separation is not received, take action to obtain the report no later than 5 minutes after the aircraft was estimated over the fix.

6-3 DUPLICATE POSITION REPORTS

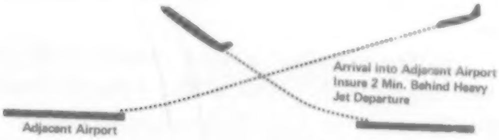
Do not require an aircraft to make the same position report to more than one facility.

6-4 ADJACENT AIRPORT OPERATION

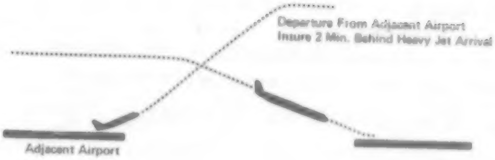
TERMINAL

WAKE TURBULENCE APPLICATION

The ATC facility providing service to heavy jets and having control jurisdiction at adjacent airports shall separate arriving or departing IFR aircraft on a course that will cross behind the flight path of a heavy jet — *2 minutes.*


Adjacent Airport
Arrival into Adjacent Airport
Insure 2 Min. Behind Heavy
Jet Departure

6-4 Illustration 1


Departure From Adjacent Airport
Insure 2 Min. Behind Heavy Jet Arrival
Adjacent Airport

6-4 Illustration 2

6-5 ARRIVAL MINIMA

TERMINAL

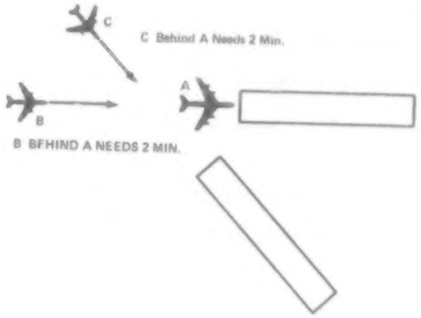
WAKE TURBULENCE APPLICATION

Separate IFR aircraft landing behind an arriving heavy jet by *2 minutes* when arriving:

a. The same runway (use *3 minutes* for a small aircraft behind a heavy jet).

b. A parallel runway separated by less than 2,500 feet.

c. A crossing runway if projected flight paths will cross.


C
C Behind A Needs 2 Min.
A
B
B BEHIND A NEEDS 2 MIN.

6-5a&c Illustration

6-6 thru 6-9 RESERVED

Section 2. INITIAL SEPARATION OF SUCCESSIVE DEPARTING AIRCRAFT

6-10 MINIMA ON DIVERGING COURSES

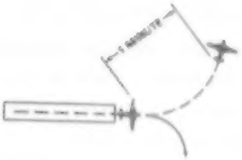
Separate aircraft that will fly courses diverging by 45 degrees or more after departing the same or adjacent airports by use of one of the following minima:

6-10 Note 1. — Consider known aircraft performance characteristics when applying initial separation to successive departing aircraft.

6-10 Note 2. — When one or both of the departure surfaces is a helipad, use the takeoff course of the helicopter as a reference, comparable to the centerline of a runway and the helipad center as the threshold.

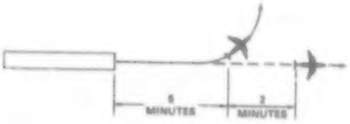
a. When aircraft will fly diverging courses:

(1) Immediately after takeoff — *1 minute* until courses diverge.



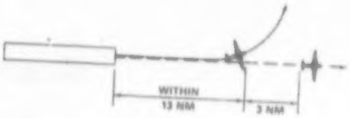
6-10a(1) Illustration

(2) Within 5 minutes after takeoff — *2 minutes* until courses diverge.



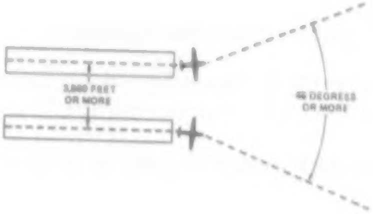
6-10a(2) Illustration

(3) Within 13 miles DME after takeoff — *3 miles* until courses diverge.



6-10a(3) Illustration

b. *TERMINAL:* Between aircraft departing in the same direction from different runways whose centerlines are parallel and separated by at least 3,500 feet — Authorize simultaneous takeoffs when the aircraft will fly diverging courses immediately after takeoff.



ILLUSTRATION

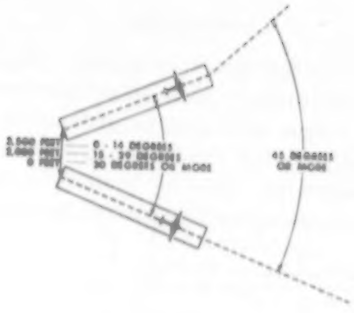
c. *TERMINAL:* Between aircraft that will fly diverging courses immediately after takeoff from diverging runways:

(1) Nonintersecting runways — Authorize simultaneous takeoffs when either of the following conditions exist:

(a) The runways diverge by 30 degrees or more.

(b) The distance between runway centerlines at and beyond the points where takeoffs begin is at least:

(i) 2,000 feet and the runways diverge by 15 to 29 degrees inclusive.

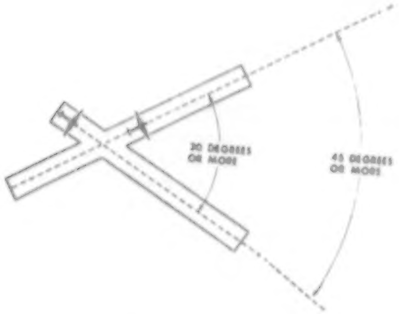

3,500 FEET
2,000 FEET
0 FEET
0 - 14 DEGREES
15 - 29 DEGREES
30 DEGREES OR MORE
45 DEGREES OR MORE

ILLUSTRATION

(ii) 3,500 feet and the runways diverge by less than 15 degrees.

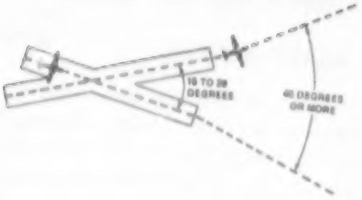
(2) Intersecting runways — Authorize takeoff of a succeeding aircraft when the preceding aircraft has passed the point of runway intersection, and

(a) The runways diverge by 30 degrees or more.


30 DEGREES OR MORE
45 DEGREES OR MORE

ILLUSTRATION

(b) The runways diverge by 15 to 29 degrees inclusive and the preceding aircraft has commenced a turn.


15 TO 29 DEGREES
45 DEGREES OR MORE

ILLUSTRATION

6-11 MINIMA ON SAME COURSE

Separate aircraft that will fly the same course when the following aircraft will climb thorough the altitude assigned to the leading aircraft by using a minimum of *3 minutes* until the following aircraft passes through the assigned altitude of the leading aircraft; or *5 miles* if both aircraft are using DME.

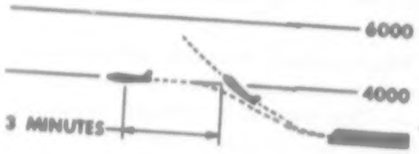

6000
4000
3 MINUTES

ILLUSTRATION 1

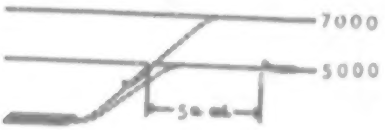

7000
5000
5 mi.

Illustration 2

6-12 thru 6-19 RESERVED

Section 3. INITIAL SEPARATION OF DEPARTING AND ARRIVING AIRCRAFT

6-20 SEPARATION MINIMA

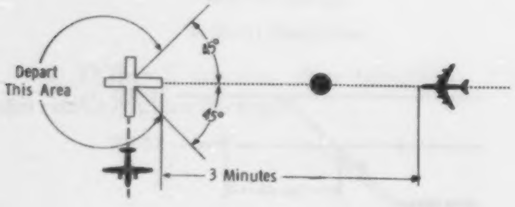
Separate a departing aircraft from an arriving aircraft making an instrument approach to the same airport by using one of the following minima until vertical or lateral separation is achieved:

a. *TERMINAL:* When takeoff direction differs by at least 45 degrees from the reciprocal of the final approach course — The departing aircraft takes off before the arriving aircraft leaves a fix inbound not less than *4 miles* from the airport.

b. *TERMINAL:* When takeoff direction is other than in a. — The departing aircraft takes off so that it is established on a course diverging by at least 45 degrees from the reciprocal of the final approach course before the arriving aircraft leaves a fix inbound not less than *4 miles* from the airport.

c. *TERMINAL:* When the absence of an appropriate fix precludes the application of a or **b**, and at airports where approach control service is not provided — The separation in **d** or **e** shall be applied.

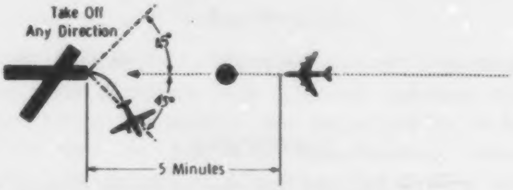
d. When takeoff direction differs by at least 45 degrees from the reciprocal of the final approach course — The departing aircraft takes off *3 minutes* before the arriving aircraft is estimated at the airport.



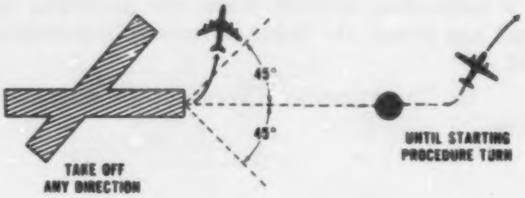
6-20d Illustration

ILLUSTRATION

e. When takeoff direction is other than in **d** — The departing aircraft takes off so that it is established on a course diverging by at least 45 degrees from the reciprocal of the final approach course *5 minutes* before the arriving aircraft is estimated at the airport or before it starts procedure turn.



6-20e Illustration 1



6-20e Illustration 2

6-21 thru 6-29 RESERVED

TABLE OF CONTENTS

Chapter 7. VISUAL

Page

Section 1. GENERAL

7-1 Positive Control Area Restrictions 7-1
7-2 VFR Conditions 7-1
7-3 Approach Control Service for VFR Arriving Aircraft 7-1
7-4 Visual Holding of VFR Aircraft 7-1
7-5—7-9 Reserved 7-1

Section 2. VISUAL SEPARATION

7-10 Visual Separation 7-2
7-11—7-19 Reserved 7-2

Section 3. VFR-ON-TOP

7-20 VFR-On-Top 7-3
7-21 Altitude for Direction of Flight 7-3
7-22—7-29 Reserved 7-3

Section 4. APPROACHES

7-30 Visual Approach 7-4
7-31 Visual Approaches — Radar 7-4
7-32 Clearance for Visual Approach — Radar 7-5
7-33 Multiple Runway Application (Visual) — Radar 7-5
7-34 Charted Visual Flight Procedures (CVFP) 7-5
7-35 Contact Approach 7-6
7-36—7-39 Reserved 7-6

Section 5. SPECIAL VFR

7-40 Authorization 7-7
7-41 Priority 7-7
7-42 Separation 7-7
7-43 Altitude Assignment 7-7
7-44 Local Operations 7-7
7-45 Climb to VFR 7-8
7-46 Ground Visibility Below One Mile 7-8
7-47 Flight Visibility Below One Mile 7-8
7-48 Special VFR Helicopter Separation 7-8
7-49 Local Procedures 7-8
7-50—7-59 Reserved 7-10

Section 6. BASIC RADAR SERVICE TO VFR AIRCRAFT — *TERMINAL*

7-60 Application 7-11
7-61—7-69 Reserved 7-11

Section 7. STAGE II SERVICE — *TERMINAL*

7-70 Application 7-12
7-71 Service Availability 7-12
7-72 Initial Contact 7-12
7-73 Identification 7-12
7-74 Holding 7-12
7-75 Approach Sequence 7-12
7-76 Sequencing 7-12
7-77 Control Transfer 7-12

READEX FICHE

TABLE OF CONTENTS—Continued

Page

7-78 Abandoned Approach 7-12
7-79 VFR Departure Information 7-13
7-80 Service Provided When Tower Is Inoperative 7-13
7-81—7-89 Reserved 7-13

Section 8. STAGE III SERVICE — *TERMINAL*

7-90 Application 7-14
7-91 Issuance of EFC 7-14
7-92 Separation 7-14
7-93 Helicopter Traffic 7-14
7-94 Altitude Assignments 7-14
7-95 Approach Interval 7-15
7-96 TRSA Departure Information 7-15
7-97 TCA Methods 7-15
7-98—7-99 Reserved 7-15

Section 9. AIRPORT RADAR SERVICE AREA (ARSA) SERVICE — *TERMINAL*

7-100 Application 7-16
7-101 Issuance of EFC 7-16
7-102 Separation 7-16
7-103 Helicopter Traffic 7-16
7-104 Altitude Assignments 7-16
7-105 Approach Interval 7-16
7-106 ARSA Departure Information 7-16

7-79 VFR DEPARTURE INFORMATION

Inform departing VFR aircraft who request radar traffic advisories when to contact departure control and the frequency to use. After the departure is identified, provide traffic advisories in accordance with 2-21.

7-79 Note. — Departing aircraft desiring traffic information are expected to request the service and to state their proposed direction of flight upon initial contact with ground control

7-80 SERVICE PROVIDED WHEN TOWER IS INOPERATIVE

a. Provide the following services during hours when the tower is not in operation:

(1) Wind direction and velocity.

7-80a(1) Note. — Issue information provided from the FSS or WSO. Otherwise, inform the pilot that wind information is not available.

(2) Traffic information.

(3) Inform aircraft when radar service is terminated.

7-80a(3) Reference. — Radar Service Termination, 5-13.

b. Do not assign landing sequence.

7-81 thru 7-89 RESERVED

Section 8. STAGE III SERVICE — *TERMINAL*

7-90 APPLICATION

In addition to the basic services described in 7-60 and the Stage II services, apply Stage III procedures within the designated Terminal Radar Service Area (TRSA) or Terminal Control Area (TCA).

7-91 ISSUANCE OF EFC

When VFR aircraft are held either inside or outside the TRSA/TCA, inform the pilot when to expect further clearance.

7-92 SEPARATION

Any of the following may be applied within a TRSA/TCA:

7-92 Note 1. — Assignment of radar headings, routes, or altitudes is based on the provision that a pilot operating in accordance with VFR is expected to advise ATC if compliance will cause him to violate any FAR's.

7-92 Note 2. — Stage III separation and sequencing for VFR aircraft is dependent upon radar. When a radar outage occurs, efforts should be made to segregate VFR traffic from the IFR traffic flow.

a. Visual separation, as specified in 7-10, 7-31, and 7-76.

7-92a Note. — The provisions of 7-33b & c are applicable to Stage III operations.

7-92a Reference. — Glossary (Visual Separation).

b. *500 feet* vertical separation between VFR aircraft and between a VFR and an IFR aircraft.

7-92b Note. — 500 feet vertical separation shall not be applied below a heavy jet.

7-92b Reference. — Minima (Radar Separation), 5-72.

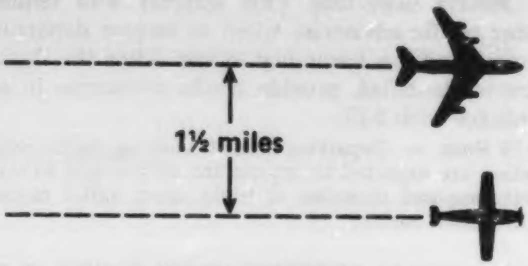
c. Within 15 miles of the radar antenna, separate helicopters and Category I and II VFR aircraft from:

7-92c Note. — This procedure DOES NOT apply between IFR aircraft.

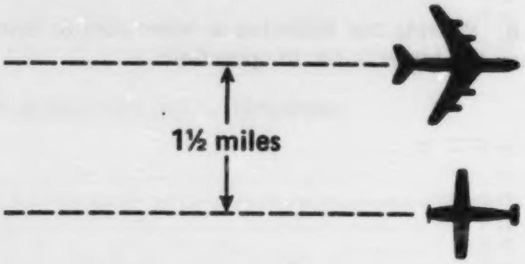
7-92c Reference. — Aircraft Categories, 3-106a. Note.

(1) Other Category I or II VFR/IFR aircraft by a minimum of *1 ½ miles.*

(2) Category III VFR/IFR aircraft by *1 ½ miles* only when both aircraft are on parallel courses.



7-92c.(2) ILLUSTRATION 1



7-92c.(2) ILLUSTRATION 2

d. Within 1 mile of the runway end, ½ mile lateral separation between a helicopter and a fixed-wing aircraft/IFR helicopter on a straight-in approach or a straight-out departure.

7-92d Note. — This procedure applies when either of the two aircraft being separated is within 1 mile of the runway end.

7-92d Reference. — Glossary (Lateral Separation).

7-93 HELICOPTER TRAFFIC

Helicopters need not be separated from other helicopters. Traffic information shall be exchanged, as necessary.

7-94 ALTITUDE ASSIGNMENTS

a. Altitude information contained in a clearance, instruction, or advisory to VFR aircraft shall meet MVA, minimum safe altitude, or minimum IFR altitude criteria.

b. If required, issue altitude assignments, consistent with the provisions of FAR 91.79.

7-94b Note. — The minimum safe altitudes are (1) over congested areas, an altitude at least 1,000 feet above the highest obstacle, and (2) over other than congested areas, an altitude at least 500 feet above the surface.

7-94a Reference. — Flight Direction, 4-40; Exceptions, 4-41; Minimum En route Altitudes, 4-44.

c. When necessary to assign an altitude for separation purposes to VFR aircraft contrary to FAR 91.109, advise the aircraft to resume altitudes

APPROACH SEQUENCE— The order in which aircraft are positioned while on approach or awaiting approach clearance. (See Landing Sequence)

*ICAO—APPROACH SEQUENCE—*The order in which two or more aircraft are cleared to approach to land at the aerodrome.

APPROACH SPEED— The recommended speed contained in aircraft manuals used by pilots when making an approach to landing. This speed will vary for different segments of an approach as well as for aircraft weight and configuration.

APRON/RAMP— A defined area on an airport or heliport intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking, or maintenance. With regard to seaplanes, a ramp is used for access to the apron from the water.

*ICAO—APRON—*A defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking or maintenance.

ARC— The track over the ground of an aircraft flying at a constant distance from a navigational aid by reference to distance measuring equipment (DME).

AREA NAVIGATION/RNAV— A method of navigation that permits aircraft operation on any desired course within the coverage of station-referenced navigation signals or within the limits of a self-contained system capability. The major types of equipment are:

1. VORTAC referenced or Course Line Computer (CLC) systems, which account for the greatest number of RNAV units in use. To function, the CLC must be within the service range of a VORTAC.
2. OMEGA/VLF, although two separate systems, can be considered as one operationally. A long-range navigation system based upon Very Low Frequency radio signals transmitted from a total of 17 stations worldwide.
3. Inertial (INS) systems, which are totally self-contained and require no information from external references. They provide aircraft position and navigation information in response to signals resulting from inertial effects on components within the system.

Random Area Navigation routes are direct routes, based on area navigation capability, between waypoints defined in terms of latitude/longitude coordinates, degree/distance fixes, or offsets from published or established routes/airways at a specified distance and direction.

*ICAO—AREA NAVIGATION/RNAV—*A method of navigation which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids or a combination of these.

ARMY AVIATION FLIGHT INFORMATION BULLETIN/USAFIB— A bulletin that provides air operation data covering Army, National Guard, and Army Reserve aviation activities.

ARRESTING SYSTEM— A safety device consisting of two major components, namely, engaging or catching devices, and energy absorption devices for the purpose of arresting both tail hook and/or non-tail hook equipped aircraft. It is used to prevent aircraft from overrunning runways when the aircraft cannot be stopped after landing or during aborted takeoff. Arresting systems have various names; e.g., arresting gear, hook, device, wire barrier cable. (See Abort) (Refer to AIM)

ARRIVAL TIME— The time an aircraft touches down on arrival.

ARTCC— (See Air Route Traffic Control Center)

ASR APPROACH— (See Surveillance Approach)

ATC ADVISES— Used to prefix a message of noncontrol information when it is relayed to an aircraft by other than an air traffic controller. (See Advisory)

ATC ASSIGNED AIRSPACE/ATCAA— Airspace of defined vertical/lateral limits, assigned by ATC, for the purpose of providing air traffic segregation between the specified activities being conducted within the assigned airspace and other IFR air traffic. (See Military Operations Area, Alert Area)

ATC CLEARANCE— (See Air Traffic Clearance)

ATC CLEARS— Used to prefix an ATC clearance when it is relayed to an aircraft by other than an air traffic controller.

ATC INSTRUCTIONS— Directives issued by air traffic control for the purpose of requiring a pilot to take specific actions; e.g., "Turn left heading two five zero," "Go around," "Clear the runway." (Refer to FAR Part 91)

ATCRBS— (See Radar)

ATC REQUESTS— Used to prefix an ATC request when it is relayed to an aircraft by other than an air traffic controller.

AUTOMATED RADAR TERMINAL SYSTEMS/ARTS— The generic term for the ultimate in functional capability afforded by several automation systems. Each differs in functional capabilities and equipment. ARTS plus a suffix roman numeral denotes a specific system. A following letter indicates a major modification to that system. In general, an ARTS displays for the terminal controller aircraft identification, flight plan data, other flight associated information, e.g., altitude and speed, and aircraft position symbols in conjunction with his radar presentation. Normal radar co-exists with the alphanumeric display. In addition to enhancing visualization of the air traffic situation, ARTS facilitate intra/inter-facility transfer and coordination of flight information. These capabilities are enabled by specially designed computers and subsystems tailored to the radar and communications equipments and operational requirements of each automated facility. Modular design permits adoption of improvements in computer software and electronic technologies as they become available while retaining the characteristics unique to each system.

1. ARTS II—A programmable non-tracking, computer aided display subsystem capable of modular expansion. ARTS II systems provide a level of automated air traffic control capability at terminals having low to medium activity. Flight identification and altitude may be associated with the display of secondary radar targets. Also, flight plan information may be exchanged between the terminal and ARTCC.
2. ARTS III—The Beacon Tracking Level (BTL) of the modular programmable automated radar terminal system in use at medium to high activity terminals. ARTS III detects, tracks and predicts secondary radar derived aircraft targets. These are displayed by means of computer-generated symbols and alphanumeric characters depicting flight identification, aircraft altitude, ground speed and flight plan data. Although it does not track primary targets, they are displayed coincident with the secondary radar as well as the symbols and alphanumerics. The system has the capability of communicating with ARTCCs and other ARTS III facilities.
3. ARTS IIIA—The Radar Tracking and Beacon Tracking Level (RT&BTL) of the modular, programmable automated radar terminal system. ARTS IIIA detects, tracks and predicts primary as well as secondary radar-derived aircraft targets. This more sophisticated computer-driven system upgrades the existing ARTS III system by providing improved tracking, continuous data recording and fail-soft capabilities.

AUTOMATIC ALTITUDE REPORTING— That function of a transponder which responds to Mode C interrogations by transmitting the aircraft's altitude in 100-foot increments.

AUTOMATIC CARRIER LANDING SYSTEM/ ACLS— U.S. Navy final approach equipment consisting of precision tracking radar coupled to a computer data link to provide continuous information to the aircraft, monitoring capability to the pilot and a backup approach system.

AUTOMATIC DIRECTION FINDER/ADF— An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum. (See Bearing, Nondirectional Beacon)

AUTOMATIC TERMINAL INFORMATION SERVICE/ATIS— The continuous broadcast of recorded noncontrol information in selected terminal areas. Its purpose is to improve controller effectiveness and to relieve frequency congestion by automating the repetitive transmission of essential but routine information, e.g.,"Los Angeles information Alfa. One three zero zero Greenwich. Weather, measured ceiling two thousand overcast, visibility three, haze, smoke, temperature seven one, dew point five seven, wind two five zero at five, altimeter two niner niner six. I-L-S Runway Two Five Left approach in use, Runway Two Five Right closed, advise you have Alfa." (Refer to AIM)

ICAO—AUTOMATIC TERMINAL INFORMATION SERVICE—The provision of current, routine information to arriving and departing aircraft by means of continuous and repetitive broadcasts throughout the day or a specified portion of the day.

AUTOROTATION— A rotorcraft flight condition in which the lifting rotor is driven entirely by action of the air when the rotorcraft is in motion.

1. Autorotative Landing/Touchdown Autorotation—Used by a pilot to indicate that he will be landing without applying power to the rotor.
2. Low Level Autorotation—Commences at an altitude well below the traffic pattern, usually below 100 feet AGL and is used primarily for tactical military training.
3. 180 degrees Autorotation—Initiated from a downwind heading and is commenced well inside the normal traffic pattern. "Go around" may not be possible during the latter part of this maneuver.

AVIATION WEATHER SERVICE— A service provided by the National Weather Service (NWS) and FAA which collects and disseminates pertinent weather information for pilots, aircraft operators, and ATC. Available aviation weather reports and forecasts are displayed at each NWS office and FAA FSS. (See En Route Flight Advisory Service, Transcribed Weather Broadcast, Weather Advisory, Pilots Automatic Telephone Weather Answering Service) (Refer to AIM)

BASE LEG— (See Traffic Pattern)

BEACON— (See Radar, Nondirectional Beacon, Marker Beacon, Airport Rotating Beacon, Aeronautical Beacon, Airway Beacon))

BEARING— The horizontal direction to or from any point, usually measured clockwise from true north, magnetic north, or some other reference point, through 360 degrees. (See Nondirectional Beacon)

BELOW MINIMUMS— Weather conditions below the minimums prescribed by regulation for the particular action involved; e.g., landing minimums, takeoff minimums.

BLAST FENCE— A barrier that is used to divert or dissipate jet or propeller blast.

BLIND SPEED— The rate of departure or closing of a target relative to the radar antenna at which cancellation of the primary radar target by moving target indicator (MTI) circuits in the radar equipment causes a reduction or complete loss of signal.

ICAO—BLIND VELOCITY—The radial velocity of a moving target such that the target is not seen on primary radars fitted with certain forms of fixed echo suppression.

BLIND SPOT/BLIND ZONE— An area from which radio transmissions and/or radar echoes cannot be realong the proposed route from the departure airport to the center boundary is less than or equal to the value of PBCT or if airport adaptation specifies transmission regardless of PBCT.

PUBLISHED ROUTE— A route for which an IFR altitude has been established, and published, e.g., Federal Airways, Jet Routes, Area Navigation Routes, Specified Direct Routes.

QUADRANT— A quarter part of a circle, centered on a NAVAID, oriented clockwise from magnetic north as follows: NE quadrant 000-089, SE quadrant 090-179, SW quadrant 180-269, NW quadrant 270-359.

QUICK LOOK— A feature of NAS Stage A and ARTS which provides the controller the capability to display full data blocks of tracked aircraft from other control positions.

QUOTA FLOW CONTROL/QFLOW— A flow control procedure by which the Central Flow Control Function (CFCF) restricts traffic to the ARTC Center area having an impacted airport thereby avoiding sector/area saturation. (See Air Traffic Control Systems Command Center) (Refer to Airport/Facility Directory)

RADAR/RADIO DETECTION AND RANGING— A device which, by measuring the time interval between transmission and reception of radio pulses and correlating the angular orientation of the radiated antenna beam or beams in azimuth and/or elevation, provides information on range, azimuth, and/or elevation of objects in the path of the transmitted pulses.

1. Primary Radar—A radar system in which a minute portion of a radio pulse transmitted from a site is reflected by an object and then received back at that site for processing and display at an air traffic control facility.
2. Secondary Radar/Radar Beacon/ATCRBS—A radar system in which the object to be detected is fitted with cooperative equipment in the form of a radio receiver/transmitter (transponder). Radar pulses transmitted from the searching transmitter/receiver (interrogator) site are received in the cooperative equipment and used to trigger a distinctive transmission from the transponder. This reply transmission rather than a reflected signal, is then received back at the transmitter/receiver site for processing and display at an air traffic control facility. (See Transponder, Interrogator) (Refer to AIM)

ICAO—RADAR— A radio detection device which provides information on range, azimuth, and/or elevation of objects.

1. Primary Radar—A radar system which uses reflected radio signals.
2. Secondary Radar—A radar system wherein a radio signal transmitted from a radar station initiates the transmission of a radio signal from another station.

RADAR ADVISORY— The provision of advice and information based on radar observations. (See Advisory Service)

RADAR APPROACH— An instrument approach procedure which utilizes Precision Approach Radar (PAR) or Airport Surveillance Radar (ASR). (See PAR Approach, Surveillance Approach, Airport Surveillance Radar, Precision Approach Radar, Instrument Approach Procedure) (Refer to AIM)

ICAO—RADAR APPROACH— An approach, executed by an aircraft, under the direction of a radar controller.

RADAR APPROACH CONTROL FACILITY— A terminal ATC facility that uses radar and nonradar capabilities to provide approach control services to aircraft arriving, departing, or transiting airspace controlled by the facility (see Approach Control Service). Provides radar ATC services to aircraft operating in the vicinity of one or more civil and/ or military airports in a terminal area. The facility may provide services of a ground controlled approach (GCA); i.e., ASR and PAR approaches. A radar approach control facility may be operated by FAA, USAF, US Army, USN, USMC, or jointly by FAA and a military service. Specific facility nomenclatures are used for administrative purposes only and are related to the physical location of the facility and the operating service generally as follows:

Army Radar Approach Control/ARAC (Army).

Radar Air Traffic Control Facility/ RATCF (Navy/FAA).

Radar Approach Control/RAPCON (Air Force/FAA).

Terminal Radar Approach Control/TRACON (FAA).

Tower/Airport Traffic Control Tower/ATCT (FAA). (Only those towers delegated approach control authority.)

RADAR ARRIVAL— An arriving aircraft which is being vectored to the final approach course for an instrument approach or toward the airport for a visual approach. (See Radar Approach, Visual Approach)

RADAR BEACON— (See Radar)

RADAR CONTACT—

1. Used by ATC to inform an aircraft that it is identified on the radar display and radar flight following will be provided until radar identification is terminated. Radar service may also be provided within the limits of necessity and capability. When a pilot is informed of "radar contact" he automatically discontinues reporting over compulsory reporting points. (See Radar Flight Following, Radar Contact Lost, Radar Service, Radar Service Terminated). (Refer to AIM)
2. The term used to inform the controller that the aircraft is identified and approval is granted for the aircraft to enter the receiving controllers airspace.

ICAO—RADAR CONTACT— The situation which exists when the radar blip of a particular aircraft is seen and identified on a radar display.

RADAR CONTACT LOST— Used by ATC to inform a pilot that radar identification of his aircraft has been lost. The loss may be attributed to several things including the aircraft merging with weather or ground clutter, the aircraft flying below radar line of sight, the aircraft entering an area of poor radar return or a failure of the aircraft transponder or ground radar equipment. (See Clutter, Radar Contact)

RADAR ENVIRONMENT— An area in which radar service may be provided. (See Radar Contact, Radar Service, Additional Services, Traffic Advisories)

RADAR FLIGHT FOLLOWING— The observation of the progress of radar identified aircraft, whose primary navigation is being provided by the pilot, wherein the controller retains and correlates the aircraft identity with the appropriate target or target symbol displayed on the radar scope. (See Radar Contact, Radar Service) (Refer to AIM)

RADAR IDENTIFICATION— The process of ascertaining that an observed radar target is the radar return from a particular aircraft. (See Radar Contact, Radar Service)

ICAO—RADAR IDENTIFICATION—The process of correlating a particular radar blip with a specific aircraft.

RADAR IDENTIFIED AIRCRAFT— An aircraft, the position of which has been correlated with an observed target or symbol on the radar display. (See Radar Contract, Radar Contact Lost)

RADAR MONITORING— (See Radar Service)

RADAR NAVIGATIONAL GUIDANCE— (See Radar Service)

RADAR POINT OUT/POINT OUT— Used between controllers to indicate radar handoff action where the initiating controller plans to retain communications with an aircraft penetrating the other controller's airspace and additional coordination is required.

RADAR ROUTE— A flight path or route over which an aircraft is vectored. Navigational guidance and altitude assignments are provided by ATC. (See Flight Path, Route)

RADAR SEPARATION— (See Radar Service)

RADAR SERVICE— A term which encompasses one or more of the following services based on the use of radar which can be provided by a controller to a pilot of a radar identified aircraft.

1. Radar Separation.—Radar spacing of aircraft in accordance with established minima.

ICAO—RADAR SEPARATION— The separation used when aircraft position information is derived from radar sources.

2. Radar Navigational Guidance.—Vectoring aircraft to provide course guidance.
3. Radar Monitoring.—The radar flight following of aircraft, whose primary navigation is being performed by the pilot, to observe and note deviations from its authorized flight path, airway, or route. When being applied specifically to radar monitoring of instrument approaches, i.e., with precision approach radar (PAR) or radar monitoring of simultaneous ILS approaches, it includes advice and instructions whenever an aircraft nears or exceeds the prescribed PAR safety limit or simultaneous ILS no transgression zone. (See Additional Services, Traffic Advisories)

ICAO—RADAR MONITORING— The use of radar for the purpose of providing aircraft with information and advice relative to significant deviations from nominal flight path.

ICAO—RADAR SERVICE— Term used to indicate a service provided directly by means of radar.

RADAR SERVICE TERMINATION— Used by ATC to inform a pilot that he will no longer be provided any of the services that could be received while in radar contact. Radar service is automatically terminated, and the pilot is not advised in the following cases:

1. An aircraft cancels its IFR flight plan, except within a TCA, TRSA, ARSA, or where Stage II service is provided.
2. An aircraft conducting an instrument, visual, or contact approach has landed or has been instructed to change to advisory frequency.
3. An arriving VFR aircraft receiving radar service to a tower controlled airport within a TCA, TRSA, ARSA, or where Stage II service is provided, has landed, OR to all other airports, is instructed to change to tower or advisory frequency.
4. An aircraft completes a radar approach.

RADAR SURVEILLANCE— The radar observation of a given geographical area for the purpose of performing some radar function.

RADAR TRAFFIC ADVISORIES— (See Traffic Advisories)

RADAR TRAFFIC INFORMATION SERVICE— (See Traffic Advisories)

RADAR WEATHER ECHO INTENSITY LEVELS— Existing radar systems cannot detect turbulence. However, there is a direct correlation between the degree of turbulence and other weather features associated with thunderstorms and the radar weather echo intensity. The National Weather Service has categorized six (6) levels of radar weather echo intensity. The following list gives the weather features likely to be associated with these levels during thunderstorm weather situations:

1. Level 1 (WEAK) and Level 2 (MODERATE). Light to moderate turbulence is possible with lightning.
2. Level 3 (STRONG). Severe turbulence possible, lightning.
3. Level 4 (VERY STRONG). Severe turbulence likely, lightning.
4. Level 5 (INTENSE). Severe turbulence, lightning, organized wind gusts. Hail likely.

proceed to the airport of destination in VFR conditions.

ICAO—VISUAL APPROACH—An approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed in visual reference to terrain.

VISUAL APPROACH SLOPE INDICATOR— (See Airport Lighting)

VISUAL DESCENT POINT/VDP— A defined point on the final approach course of a nonprecision straight-in approach procedure from which normal descent from the MDA to the runway touchdown point may be commenced, provided the approach threshold of that runway, or approach lights, or other markings identifiable with the approach end of that runway are clearly visible to the pilot.

VISUAL FLIGHT RULES/VFR— Rules that govern the procedures for conducting flight under visual conditions. The term "VFR" is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan. (See Instrument Flight Rules, Instrument Meteorological Conditions, Visual Meteorological Conditions) (Refer to FAR Part 91, AIM)

VISUAL HOLDING— The holding of aircraft at selected, prominent, geographical fixes which can be easily recognized from the air. (See Hold, Holding Fixes)

VISUAL METEOROLOGICAL CONDITIONS/ VMC— Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima. (See Instrument Flight Rules, Instrument Meteorological Conditions, Visual Flight Rules)

VISUAL SEPARATION— A means employed by ATC to separate aircraft in terminal areas. There are two ways to effect this separation:

1. The tower controller sees the aircraft involved and issues instructions, as necessary, to ensure that the aircraft avoid each other.
2. A pilot sees the other aircraft involved and upon instructions from the controller provides his own separation by maneuvering his aircraft as necessary to avoid it. This may involve following another aircraft or keeping it in sight until it is no longer a factor. (See See and Avoid) (Refer to FAR Part 91)

VORTAC/VHF OMNIDIRECTIONAL RANGE/TACTICAL AIR NAVIGATION— A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance measuring equipment (DME) at one site. (See Distance Measuring Equipment, Navigational Aid TACAN, VOR) (Refer to AIM)

VORTICES/WING TIP VORTICES— Circular patterns of air created by the movement of an airfoil through the air when generating lift. As an airfoil moves through the atmosphere in sustained flight, an area of area of low pressure is created above it. The air flowing from the high pressure area to the low pressure area around and about the tips of the airfoil tends to roll up into two rapidly rotating vortices, cylindrical in shape. These vortices are the most predominant parts of aircraft wake turbulence and their rotational force is dependent upon the wing loading, gross weight, and speed of the generating aircraft. The vortices from medium to heavy aircraft can be of extremely high velocity and hazardous to smaller aircraft. (See Aircraft Classes Wake Turbulence) (Refer to AIM)

VOR/VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION— A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the National Airspace System. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature. Voice features may be used by ATC or FSS for transmitting instructions/information to pilots. (See Navigational Aid) (Refer to AIM)

VOT/VOR TEST SIGNAL— A ground facility which emits a test signal to check VOR receiver accuracy. Some VOT's are available to the user while airborne, and others are limited to ground use only. (Refer to FAR Part 91, AIM, Airport/Facility Directory)

WAKE TURBULENCE— Phenomena resulting from the passage of an aircraft through the atmosphere. The term includes vortices, thrust stream turbulence, jet blast, jet wash, propeller wash and rotor wash, both on the ground and in the air. (See Aircraft Classes, Jet Blast, Vortices) (Refer to AIM)

WARNING AREA— See Special Use Airspace.

WAYPOINT— A predetermined geographical position used for route/instrument approach definition, or progress reporting purposes, that is defined relative to a VORTAC station or in terms of latitude/longitude coordinates.

WEATHER ADVISORY/INFLIGHT WEATHER ADVISORY— (See SIGMET, AIRMET)

WEATHER ADVISORY/WS/WST/WA/CWA— In aviation weather forecast practice, an expression of hazardous weather conditions not predicted in the area forecast, as they affect the operation of air traffic and as prepared by the NWS.

***WHEN ABLE*—** When used in conjunction with ATC instructions, gives the pilot the latitude to delay compliance until a condition or event has been reconciled. Unlike "pilot discretion," when instructions are prefaced "when able," the pilot is expected to seek the first opportunity to comply. Once a maneuver has been initiated, the pilot is expected to continue until the specifications of the instructions have been met. "When able," should not be used when expeditious compliance is required.

WILCO— **I have received your message, understand it, and will comply with it.**

WIND SHEAR— A change in wind speed and/or wind direction in a short distance resulting in a tearing or shearing effect. It can exist in a horizontal or vertical direction and occasionally in both.

WORDS TWICE—

1. **As a request: "Communication is difficult. Please say every phrase twice."**
2. **As information: "Since communications are difficult, every phrase in this message will be spoken twice."**

APPENDIX B

AIRCRAFT WEIGHT CLASSES AND GROUPS

Manufacturer/Model	Type Designator		Weight Class/ Group
	Civil	Military	
Aeronca (USA)			
Aeronca Champion	AR58		S/2
Chief/ Super Chief	AR11		S/2
Sedan	AR15		S/2
Aero Spaceline (USA)			
Guppy	AP52		L/5
Mini Guppy	AP3M		L/5
Pregnant Guppy	AP1P		L/5
Super Guppy/ Turbine	AP25/ AP45		L/5
Aerospatiale (France)			
Caravelle	S210		L/4
Concorde	CONC		H/5
Corvette SN601	S6001		L/3
Rallye MS 880/ 881/ 883	S880		S/3
Rallye Commodore MS 892.	S892		S/2
Rallye Minerva MS 894	S894		S/2
Twin Star	S355		S/2
Airbus Industries (International)			
Airbus	A300		H/5
Alon, Inc. (USA)			
Aircoupe A2	F02		S/2
Andrie Tupolev (USSR)			
Tu-114	TU114		H/5
Tu-144	TU144		H/5
Antonov (USSR)			
AN-10	AN10		L/4
AN-12	AN12		L/5
Avro (A. V. Roe) (U.K.)			
Anson	AV52		L/3
CF-100		CF00	L/4
Lancaster	LANC		L/4
Shackleton		SHC3	L/4
Beagle Aircraft (U.K.)			
Airdale	BT10		S/2
Model 206S	BT6S		S/3
Beech Aircraft (USA)			
Airliner	BE99		S/2
Baron	BE55	T42	S/2
Baron 58	BE58		S/2
●Beech 1900	BE02		L/3
Bonanza 33	BE33		S/2
Bonanza35	BE35		S/2
Bonanza 36	BE36		S/2
Duke	BE60		S/3
Duchess	BE76		S/2
King Air 90	BE90	U21	S/2
King Air 100	BE10		S/3
Mentor	BE45	T34	S/2
Queen Air 65/ A65/ 70	BE65		S/2
Queen Air 89	BE80		S/2
Seminole		U8	S/2
Sierra 24	BE24		S/2
Skipper 77	BE77		S/2
Sport 19	BE19		S/2
Stagger Wing	BE17		S/2
Sundowner	BE23		S/2
Super H18	BE8S		S/2
Super King Air 200	BE20	C12	S/3
Super Queen 88	BE88	●K	S/2
Travelair	BE95		S/2
Twin Beech 18	BE18	C45	S/2
Twin Bonanza	BE50		S/2
Bellanca Aircraft (Includes Downer/ Northern) (USA)			
Citabria	CH10		S/2
Citabria 7ECA	CH9		S/2
Cruisair Sr./ Cruisemaster 14—19.	BL14		S/2
Decathlon	BL30		S/2
Scout	BL28		S/2
Viking	BL26		S/2
Boeing Aircraft (USA)			
707 100/200	B707		L/5
707 300/400	H/B707		H/5
720	B720		L/5
720B	B72S		L/5
727	B727		L/4
737	B737	T43	L/4
●737	B73S		L/4
747	B747	E4A	H/5A
747SP	B74S		H/5
757	B757		L/4
767	B767		H/5
AWACS		E3A	H/5
EC135		E135	L/5
Stearman	B75		S/2
Stratofortress		B52	H/5
Stratofreighter		KC97	L/4
Stratolifter B717		C135	L/5
Stratotanker KC135		KC135	L/5
VC37B		C137B	L/5
VC37C		C137C	H/5
YC14		YC14	L/4
Bristol Aircraft (U.K.)			
Britannia 310	BR31		L/5
British Aerospace Corp. (U.K.)			
BAC 111	BA11		L/4
BAC 146/ 200	BA46		L/4
Harrier		AV8*	L/4
HS/DH 125—600/ 700	HS25		L/3
HS 748 Series	HS748		L/4
●Jetstream 31	BA14		L/3
Super VC 10	BA15	VC15	H/5
Trident	HS21		L/4
Vanguard	VC9		L/4
VC 10	BA10	VC10	H/5
Viscount	VC7		L/4
Vulcan		VLCN	H/4

Manufacturer/Model	Type Designator Civil	Type Designator Military	Weight Class/ Group
Britton Norman Ltd. (U.K.)			
Islander	BN2		S/2
Trislander-Mark 3	BN3		S/2
Bushmaster Aircraft Corp. (USA)			
Bushmaster 2000	BU20		L/3
Camair (USA)			
Model 480 (Twin Navion)	CM48		S/3
Yukon	CC06		L/4
Candair Ltd. (Canada)			
Argus	CL28	CP07	L/4
Challenger	CL60		L/4
Cosmopolitan, (Convair 540).	CL66/ CV54	CC009	L/4
North Star	NSTR		L/4
Starfighter	CF04	F104*	L/5
Yukon (Freightliner)	CL44	CC06	L/5
Cessna Aircraft (USA)			
120	C120		S/2
140	C14		S/2
150	C150		S/2
152	C152		S/2
170	C170		S/2
172 Skyhawk	C172	T41	S/2
175 Skylark	C175		S/2
177 Cardinal	C177		S/2
180	C180		S/2
182	C182		S/2
185 Skywagon	C185		S/2
188 Agwagon	C188		S/2
190	C190		S/2
195	C195		S/2
205	C205		S/2
206	C206		S/2
207 Super Skywagon	C207		S/2
210	C210		S/2
Crusader	C303		S/2
305/ 321 Bird Dog	C305	O1	S/2
310	C310	U3	S/2
318		T37*	S/2
318E Dragonfly		A37*	S/2
320 Skynight	C320		S/2
336 Skymaster	C336		S/2
Super Skymasterr	C337	O2	S/2
340	C340		S/2
401	C401		S/2
402	C402		S/2
411	C411		S/2
414	C414		S/2
421	C421		S/2
Corsair	C425		S/2
441	C441		S/2
Citation I/ II	C500		S/3
Citation III	C50S		S/3
●Citation 650	C650		L/3
Champion Aircraft Corp. (USA)			
Challenger	CH8		S/2
Lancer 402	CH40		S/2
Traveler/ Tri-Traveler	CH7		S/2
Construcciones Aeronauticas (Spain)			
Model 212	CA21		L/2
Curtis Wright (USA)			
Commando	CW46	C46	L/3
Dassault (France)			
Falcon 10	DA10		L/3
Falcon 20	FFJ	HU25	L/3
Falcon 50	DA50		L/3
Mercure	DA01	@K	L/5
Mercure 200	DA02		L/5
DeHavilland (Canada & U.K.)			
Beaver	DH2	U6	S/2
Buffalo	DH5	C8	L/3
Caribou	DH4	C7A	L/3
Chipmonk	DH1		S/2
Comet 2	DH62		L/5
Comet 4	DH64		L/5
Dash 7	DH7		L/2**
Dove (Devon)	DH10		S/2
Heron	DH11		S/2
Otter	DH3	U1	S/2
Turbo Beaver	DH2T		S/2
Twin Otter	DH6	U18	S/2
Dornier GmbH (West Germany)			
Dornier 27	DO27		S/3
Dornier 28	DO28		S/3
Embraer (Brazil)			
Bandeirante	E110		S/3
Fairchild Industries (USA)			
A10		A10A*	L/4
Cornell	FA62		S/2
●FH227/Metro IVC	FA22		L/3
Friendship F27	FA27		L/3
Flying Box Car	FA24	C119	L/4
Pilatus/ Peacemaker	PL6	AV23A	S/1
Provider		C123	L/4
Thunderchief		F105*	L/5
Fokker-VFW BV (Netherlands)			
(See VFW-Fokker)			
Foxjet International (USA)			
ST/600	FXJ		S/2
Gates Learjet Corp. (USA)			
23	LR23		S/3
24	LR24		L/3
25	LR25		L/4
35	LR35	C21	L/4
36	LR36		L/4
55	LR55		L/4
General Dynamics Corp. (USA)			
Canso/ Catalina	CV14	PBY5	L/4
Convair 240	CV24		L/4
Convair 440	CV44		L/4
Convair 580	CV58		L/4
Convair 600	CV60		L/4
Convair 640	CV64		L/4
Convair 880	CV88		L/5
Convair 990	CV99		L/5
Delta Dagger		F102*	L/5
Delta Dart		F106*	L/5
F16A/B		F16*	L/5
F111/ FB111		F111*	L/5
Liner/ Samaritan	CV34	C131	L/4
Privateer		P4	L/4
Valiant 34	CV13		S/3
Grumman Aerospace Corp. (USA)			
Ag-Cat	G164		S/2
Albatross	G64	U16	L/3
American	AA1		S/2
American Tr-2	AA2		S/2
Cheetah/ Tiger	AA5		S/2
Cougar	GA7		S/2
Cougar G93		F9*	L/5

Manufacturer/Model	Type Designator		Weight Class/ Group
	Civil	Military	
Goose/ Super Goose	G21		L/3
Greyhound		C2	L/4
Hawkeye		E2	L/5
Intruder		A6*	L/5
Mallard	G73		L/3
Mohawk	G134	OV1	S/3
Tiger		F11*	L/5
Tomcat		F14*	L/5
Tracer		E1	L/4
Tracker	G89	S2	L/4
Trader		C1	L/4
Widgeon/ Super Widgeon.	G44		L/3
Gulfstream Aerospace Corporation (USA)			
Gulfstream I	G159	VC4	L/4
Gulfstream II	G2	VC11	L/4
Gulfstream III	G3	C20	L/4
Hadley Page (U.K.)			
Jetstream	HP13		S/3
Hamburger Flugzeubau (West Gerrmany)			
Hansajet	HF32		L/3
Hamilton Aviation (USA)			
Westwind	WSW		S/3
Helio Aircraft Co. (USA)			
Courier	HE1		S/1
Stallion	HE5	AU24	S/1
Super Courier/ Tri-Courier.	HE3	U10	S/1
Howard Aero Mfg. (USA)			
Model 500 (WARO)	HW5		L/4
Ilyushin (USSR)			
IL-18	IL18		L/5
IL-38	IL38		L/4
IL-62	IL62		H/5
IL-76	IL76		H/5
Israel Aircraft Industries, Ltd. (Israel)			
Arava 101	RV01		L/3
Arava 201	RV02		L/3
Westwind 1123	WW23		L/4
Westwind 1124	WW24		L/4
Lake Aircraft (USA)			
LA-4-200 Buccaneer	LA4		S/2
Learavia Inc. (USA)			
Lear Fan	LRF		S/2
Lockheed Aircraft Corp. (USA)			
Constellation (649)	L649		L/5
Constellation (749)	L749	C121	L/5
Electra	L188		L/4
Galaxy		C5A	H/5
Hercules	L100	C130	L/4
Jetstar	L329	C140	L/4
Lodestar	L18		L/3
Neptune		P2	L/4
Orion		P3	L/4
Reconnaissance		SR71*	L/5
Sea Star		T1*	L/5
Shooting Star		T33*/ F80*	L/4
Starfighter		F104*	L/5
Starlifter		C141	H/5
Starliner	L164		L/5
Super Constellation	L49		L/5
Tri-Star	L101		H/5
U2		U2*/TR-1*	S/5
Viking		S3A	L/4
YF12A		F12	L/4
Martin Co. (Division of Martin-Marietta Corp.) (USA)			
202	M202		L/3
404	M404		L/3
Canberra		B57*	L/5
Maule			
M4/5	ML4		S/2
McDonnell-Douglas Aircraft (USA)			
DC-6B	DC6B		L/4
DC-7/7B	DC7		L/5
DC-8	DC8		L/5
DC-9	DC9	C9	L/4
DC-9/ MD-80 Series	MD80		L/4
DC-10	DC10		H/5
Eagle		F15*	L/5
Invader		B26	L/4
Liftmaster	DC6	C118	L/4
Phantom II		F4*	L/4
Seven Seas/ Speed Freighter.	DC7C		L/5
Skyhawk		A4*	L/5
Skymaster	DC4	C54	L/4
Skynight		F10*	L/5
Skyraider		A1*	L/4
Skytrain	DC3	C47	L/3
Skywarrior		A3*	L/4
Super DC3	DC3S	C117	L/3
Super DC8 30/40/50	H/DC8		H/5
Super DC8 61/62/63	DC86		H/5
Voodoo		F101*	L/5
YC15		YC15	L/3
Messerschmitt (West Germany)			
Monson	ME29		S/2
Mitsubishi (Japan)			
Marquise/ Solitaire	MU2		S/2
Diamond 1	MU3		L/3
Mooney Aircraft Co. (USA)			
Mark 10	MO10		S/2
Mark 20	MO20		S/2
Mark 21	MO21		S/2
Mark 22	MO22		S/2
Navion Aircraft Co. (USA)			
Range Master	NA1		S/2
Nihon Aeroplane Mfg. Co. (Japan)			
Model YS11	YS11		L/3
Noorduyn Norseman (Canada)			
Norseman MK (IV)	NY4		S/2
Norseman MK (V)	NY5		S/2
Nord Aviation (France)			
Martinet NC701/02		MART	L/3
Nortalas 25C1		NORD	L/3
Super Broussard 260/ 262.	ND26		L/3
Transall C160	ND16		L/3
Northrop (USA)			
F18		F18*	L/5
Talon		T38*	S/5
Tiger/ Freedom Fighter		F5*	L/5
Piaggia & Co. (Italy)			
Royal Gull	P136		S/2
Super Gull	P166		S/2
Vespa Jet	P808		L/3

Manufacturer/Model	Type Designator		Weight Class/ Group
	Civil	Military	
Pilatus Aircraft (Switzerland)			
Pilatus Porter	PL6		S/1
Turbo Porter	PL6A		S/1
Piper Aircraft (USA)			
Aerostar 700 Series	PA60		S/2
Apache	PA23		S/2
Aztec	PAZT	U11	S/2
Brave	PA36		S/2
Cherokee	PA28		S/2
Cherokee Arrow (R)	PARO		S/2
Cherokee Six/ Lance/ Saratoga.	PA32		S/2
Cheyenne I/II	PAYE		S/3
Cheyenne III/ IV	PA42		S/3
Chieftan	PA31		S/2
Clipper	PA16		S/2
Commanche	PA24		S/2
Cruiser	PA5		S/2
Cub Special	PA11		S/2
Cub Trainer	PA2		S/2
Family Cruiser	PA14		S/2
Malibu	PA46		S/2
Mohave	PA31		S/2
Navajo	PA31		S/2
Pacer	PA20		S/2
Pawnee	PA25		S/2
Seminole	PA44		S/2
Seneca	PASE		S/2
Super Cruiser	PA12		S2
Super Cub	PA18	U7	S/2
Tomahawk	PA38		S/2
Tri-Pacer/ Colt Caribbean.	PA22		S/2
Twin Commanche	PA30/ 39		S/2
Vagabond Trainer	PA15		S/2
Vagabond	PA17		S/2
Riley Aeronautics (USA)			
Model 65/ Rocket	RY65		S/2
Turbo-Executive	RY40		S/2
Rockwell International (USA)			
Aero Commander 112	AC12		S/2
Aero Commander 685	AC85		S/2
Alt-Cruiser	AC72		S/3
Bronco		OV10*	L/3
Buckeye T-20		T2*	L/5
Commander 112A	AC2A		S/2
Commander 112TC	AC2T		S/2
Commmander 114	AC14		S/2
Commander (200)	MY20		S/2
Commander (500)	AC50		S/2
Commander (520)	AC52		S/2
Commmander (560)	AC56	U9	S/2
Darter (100/150)	AC10		S/2
Grand Commander (680FL).	AC60		S/2
Jet Commander	AC21		L/3
Lark	LARK		S/2
Mitchell		B25	L/3
Navion	N145		S/2
Sabre		F86*	L/5
Sabreliner	N265	T39	L/3
Super Commander (680S).	AC68	U4	S/2
Super Sabre		F100*	L/5
Texan	N6	T6	S/2
Trojan		T28	S/2
Turbo Commander	AC6T		S/2
Vigilante		A5*	L/5
Scottish Aviation (U.K.)			
Pioneer	SCP		S/2
Twin Pioneer	SCPT		S/2
Short (U.K.)			
Belfast	SH5	SC5	L/5
Short	SHD3		L/3
Skyvan	SH7		S/3
Silvaire (USA)			
Luscombe	SL8		S/2
Stinson (USA)			
Reliant (Vultee)	ST77		S/2
Voyager/ Station Wagon (105/108).	ST75		S/2
Sud Aviation (France)			
Caravella	S210		L/4
Swearingen Aviation (USA)			
Merlin IIA	SW2		S/3
Merlin IIB	SW3		S/3
Merlin IV/ Metro	SW4		S/3
Taylorcraft (USA)			
Sportsman 19	TC19		S/2
Topper 20A	TC20		S/2
Tourist 15A	TC15		S/2
VFW-Fokker (West Germany)			
FH227	FK22		L/3
Friendship	FK27		L/3
Fellowship	FK28		L/4
VFW 614	VF14		L/3
Vought (USA)			
Corsair II		A7*	L/5
Crusader		F8*	L/5
Swift	TE1		S/2
HELICOPTERS			
Aerospatiale (France)			
Lama	HR15		S/1
Alouette II	HR30		S/1
Aloutte III	HR60		S/1
Dauphin	HR36		S/1
Ecurevil/ Astar	HR35		S/1
Gazelle	HR34		S/1
Puma	HR33		L/2
Super Frelon	HR32		L/2
Bell Helicopter (Textron) (USA)			
Biglifter	BH14		L/2
Cobra	BH09	AH1	S/1
Jet Ranger/ Long Ranger/ Sea Ranger/ Kiowa.	BH06	H58/ 57	S/1
Iroquois	BH04	UH-1H	S/1
Model 205 A-1	BH05		S/1
Sea Cobra		AH-1T	L/2
Sioux	BH13	H13	S/1
Twin Huey	BHTH	UH-1N	S/1
Boeing Vertol Co. (USA)			
Chinook	HV47	CH47	L/2
Model 105	B105		S/1
Sea Knight	HV07	CH46	L/2
Brantley-Hynes Helicopter, Inc. (USA)			
Model B-2A/B -2B	HB42		S/1
Model 305	HB43		S/1
Breda Nardi Costruzioni (Italy)			
Model 269C	NH30		S/1
Model 369D	NH50		S/1

Manufacturer/Model	Type Designator		Weight Class/ Group
	Civil	Military	
Costruzioni Aeronautiche, Agusta (Italy)			
Model 4JT-3B1	A4JT		S/1
Model A109	A109		S/1
Model 212 ASW	A212		S/1
Enstrom Corp. (USA)			
Executive	HF28		S/1
Shark	HF80		S/1
Turbo-Shark	HF8C		S/1
Fairchild/ Republic (USA)			
L3/ SL3	HH3		S/1
L4/ SL4	HH4		S/1
Raven	HH12	H23	S/1
Hughes Helicopters Div. of Summa Corp. (USA)			
AAH	HU64	YAH64	L/2
Model 269/ 300	HU30		S/1
Osage		H55	S/1
Pawnee 369/500	HU50	H6	S/1
Kaman Aircraft Corp. (USA)			
Huskie 600-3/5	HK60	H43	L/2
Seasprite		H2	L/2
Kawasaki Heavy Industries, Ltd. (Japan)			
Model BK-117	HK17		S/1
Messerschmidtt-Boelkow-Blohm (West Germany)			
Model BO 105	HM05		S/1
Model BK 117 (Kawasaki).	HK17		S/1
Panstwowe Zaklady Lotnicze (Poland)			
Model SM-1W/2	HZ1		S/1
Model Mi-2/2M	HZ2		S/1
Robinson Helicopter, Inc. (USA)			
Model R22	HR22		S/1
Sikorsky Aircraft (USA)			
Black Hawk S-70	SK70	H60	L/2
Chickasaw S-55	SK55	H19	S/1
Choctaw S-58 Seashore/ Seaboat.	SK58	H34	L/2
Lamps MK3		SH60	L/2
Model S-51	SK51		L/2
Model S-52	SK52		L/2
Model S-59	SK59		L/2
Model S-62	SK62	H52	S/1
Model S-69	SK69	H59	S/1
Model S-76	SK76		S/1
Mojave S-56	SK56	H37	L/2
RSRA S-72	SK72		L/2
Sea King S-61	SK61	H3	L/2
Sea Stallion S-65	SK65	H53	L/2
Skycrane S-64 E/F	SK64		L/2
Tarhe S-64		H54	L/2
Silvercraft (Italy)			
Model SH-4	HS4		S/1

NOTE: The weight class listings in this appendix are to be used for wake turbulence separation purposes only. The aircraft groups are general.

* Indicates single-piloted military turbojet aircraft.

** DeHavilland Dash 7 authorized 2,000 feet with letter of agreement and 7½° glide slope.

When the weight class cannot be determined from this appendix, obtain gross weight from pilot and use the appropriate weight class designator.

Groups are based on FAA-certificated stopping distance and/or manufacturer's published performance data.

APPENDIX C

STANDARD OPERATING PRACTICE (SOP) FOR TRANSFER OF RADAR IDENTIFICATION AND ASSOCIATED COORDINATION

1. PURPOSE

This appendix defines the terms and functions used in coordination associated with the transfer of radar identification, and prescribes a structured step-by-step process to be used as a norm when transferring radar identification from one controller to another. The specific step-by-step process is contained with explanatory notes.

2. BACKGROUND

In the past, the contents, methods, and practices used in coordination associated with conducting a transfer of radar identification varied among personnel. Pertinent information was often not exchanged or not completely understood. The confusion often created unnecessary increases in workload and decreases in operational efficiency. The major causes of confusion were the unrecognized differences in the meanings of terms and the inconsistency in requests and acknowledgments during coordination. The definitions and structured processes contained in this SOP have been established to enhance operational effectiveness and to facilitate the exchange of information when transferring radar identification.

The information contained in this appendix was initially developed by active air traffic controllers and first-line supervisors. The product generated by these workgroups was taken into the field and tested in a live traffic environment. Additionally, changes and recommendations from controllers at the test sites were compiled and, where warranted, incorporated into the SOP. This appendix DOES NOT in any way attempt to take flexibility or controller judgement away from the air traffic controller. The controller must still decide which action is applicable and which option to take in response to each action. The appendix only says that after controllers decide which action to initiate, they shall follow the guidelines and step-by-step processed as outlined.

3. GENERAL

a. *HANDOFF.* The SOP for the handoff action prescribes nothing essentially new although the specific step-by-step process may be new to some controllers.

The SOP allows for the action to begin as an intended handoff. The receiving controller has the options of accepting the handoff, accepting with restrictions, or denying the handoff by saying "unable." In the case of denial, time permitting, the receiving controller should state the reasons for denial. Should it be necessary to reinitiate the action later, the initiating controller should repeat the step-by-step process from the beginning.

b. *POINT OUT.* The radar point out function was incorporated into the system as a means of reducing frequency changes and expediting traffic. This function permits one controller to transfer the radar identification of an aircraft to another controller, request approval for an aircraft to enter the other controller's airspace, and retain radio contact with the aircraft. It was designed for use only when an aircraft would be in another controller's airspace for a short period of time. The present SOP was established to clarify and standardize the meaning and usage of "point out" and to document the related step-by-step process of controller-to-controller actions and communications. The term "point out" in the SOP refers to the case when the aircraft will or may enter another controller's airspace for a short period of time. The controller who initiates the point out is requesting approval to (1) enter the other controller's airspace, and (2) retain radio contact with the aircraft.

The point out action in this SOP is to be used only when it is opperationally acceptable and an expeditious alternative to the handoff action. Therefore, point out is prescribed to cover exceptions to a controller's usual actions. If points outs occur frequently in a particular part of a controller's airspace, the airspace configuration, or the procedure, or both may need to be examined and modified to reduce or eliminate the need for point out instead of handoff. If examination indicates point out actions are preferable to handoff actions, then a special procedure and written agreement may be needed.

Point out is not to be used as an alternative to handoff when the receiving controller considers a handoff to be preferred. The step-by-step process allows the receiving controller to approve the point out as coordinated, approve with restrictions, convert the point out to a handoff, or report that he is unable to accomodate at all by saying "unable." If unable, time permitting, the receiving controller should state the reason. Should it be necessary to reinitiate the action later, the intiating controller should repeat the step-by-step process from the beginning.

The point out is the initiating controller's request for the two controllers to agree on what is to be done. A point out shall always be accomplished by voice coordination. The receiving controller shall withhold the term "point out approved" until the coordination is completed.

The receiving controller is discouraged from answering a point out with lengthy or cumbersome restrictions. If the receiving controller issues lengthy or cumbersome restrictions, the required coordination is likely to be more time consuming and less desirable than a handoff.

The two controllers involved are required to make this judgement in each case. They should remember that point out is an exception to the routine handoff action and is prescribed only when it is operationally advantageous.

c. *TRAFFIC.* It is common practice to transfer radar identification of an aircraft by issuing traffic in conjunction with a handoff or point out.

The issuance of traffic with appropriate restrictions requires voice coordination in order to ensure separation of the aircraft involved. The required coordination is likely to be more time consuming and less desirable than issuing other restrictions. The issuance of "traffic" with appropriate restrictions instead of issuing other restrictions should only be used when it will provide an operational advantage. The controllers involved are required to make this judgment in each case. It must be emphasized that when using the term "traffic" for coordinating separation, the controller issuing traffic shall issue appropriate restrictions. Because "traffic" restrictions are issued with respect to an aircraft rather than a point in space, the controller accepting the restrictions shall be responsible for ensuring that approved separation is maintained between the involved aircraft. Specific examples and details of "traffic" restrictions are presented in Note 11, located at the end of this SOP.

4. STEP-BY-STEP PROCESS

a. The following pages contain the step-by-step process for carrying out the actions described in this Appendix.

b. To make the step-by-step process more understandable and easier to read, the following points are explained:

(1) Some steps contain footnotes in parenthesis; e.g., (2), (3), etc., that refer to notes which explain the action taken in that step. (These notes are found in the back of this Appendix.)

(2) Aircraft position is the distance and bearing of the aircraft from a fix, map symbol, or radar target known and displayed by both the receiving and transferring controllers.

(3) Aircraft identification refers to any accepted method for labeling the aircraft; e.g., aircraft identification or beacon code.

(4) Altitude information should include whether the aircraft is climbing or descending, the assigned altitude, and any altitude restrictions. Altitude information may be omitted when letters of agreement or facility directives ensure that the altitude information will be known by the receiving controller.

c. *HANDOFF (physical).*

Initiating Controller—	*Receiving Controller—*
(1) Move to appropriate position and manually point to the aircraft's location on the receiving controller's scope.	
(2) Wait for indication that the receiving controller is ready.	
(4) Say, "Handoff," state aircraft identification and altitude information. (Communicate other pertinent information at this time.)(1)	(3) Indicate when ready.
	(5) Look for target and establish radar identification.

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, than all "(c)" parts, etc. Example: Read (6)(a), (7)(a), (8)(a), etc.; then (6)(b), (7)(b), (8)(b), etc.

Initiating Controller—	*Receiving Controller—*
	(6)(a) State aircraft identification. Say, "Radar Contact" and, if appropriate, take action to label target. (2)(3) (b) State aircraft identification and state restrictions. Say, "Radar Contact" and if appropriate, take action to label target. (2)(3)(11a) (c) State aircraft identification. Say, "Unable." (9a)
(7)(a) Cease pointing. (b) Cease pointing. (4) (c) Cease pointing.	

BOTH CONTROLLERS MARK STRIPS OR MAKE THEIR NOTES, AS REQUIRED, AT THE END OF EACH PROCESS. (5)

d. *HANDOFF (interphone).*

Initiating Controller—	*Receiving Controller—*
(1) Make interphone connection to receive controller's position.	
(2) Listen to ensure that the interphone circuit is not in use and that the receiving controller is not delivering or receiving a voice message.	
(3) State intended receiving controller's position identification, initiating controller's position identification, and line number if required. Say "Handoff."	
	(4) State receiving controller's position identification. (6)

(SEE NOTE (10) FOR ALTERNATE CALL-UP PROCESS)

Initiating Controller—	*Receiving Controller—*
(5) State aircraft position, identification, and altitude information. (Communicate other pertinent information at this time.) (1)	

Initiating Controller—

Receiving Controller—

(6) Look for target and establish radar identification.

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, then all "(c)" parts, etc. Example: Read (7)(a), (8)(a), (9)(a), etc.; then (7)(b), (8)(b), (9)(b), etc.

(7)(a) Read back aircraft identification. Say, "Radar Contact," state operating initials, and, if appropriate, take action to label target. (2)(3)

(b) Read back aircraft identification, state restrictions. Say, "Radar Contact," state operating initials, and if appropriate, take action to label target. (2)(3)(11a)

(c) Read back aircraft identification. Say, "Unable," and state operating initials. (9a)

(8)(a) State operating initials and release the line.

(b) State operating initials and release the line. (4)

(c) State operating initials and release the line.

BOTH CONTROLLERS MARK STRIPS OR TAKE OTHER NOTES, AS REQUIRED, AT THE END OF EACH PROCESS. (5)

e. *HANDOFF (automated).*

Initiating Controller—

Receiving Controller—

(1) Take action to place the data block on receiving controller's display. (7) (Ensure that the data block is associated with the appropriate target.)

This action is not required where directives permit computer-generated handoff.

For ease of reading the following steps, read all parts "(a)" as one integrated process, then read all "(b)" as parts another process, then all "(c)" parts, etc. Example: Read (2)(a), (3)(a), (4)(a), etc.; then (2)(b), (3)(b), (4)(b), etc. "No action prescribed" means the process ended with the preceding step.

(2) When data block is observed:

(a) Take action to accept handoff.

(b) To place restrictions, make interphone connection to initiating controller's position, listen to insure that the interphone circuit is not in use and that the initiating controller is not delivering or receiving a voice message, state initiating controller's position identification, receiving controller's position identication, and line number if required. (10)(11a)

(c) If unable, follow interphone steps in (2)(b) above.

(3)(a) No action prescribed.

(b) State initiating controller's position identification. (6)(10)

(c) State initiating controller's position identification. (6)(10)

Initiating Controller—

Receiving Controller—

(4)(b) State aircraft identification and state restrictions.

(c) State aircraft identification. Say, "Unable," and state operating initials. (9a)

(5)(b) State operating initials and release the line. (4)

(c) State operating initials and release the line.

(6)(b) State operating initials, release the line, and take action to accept handoff.

(c) Release the line.

BOTH CONTROLLERS MARK STRIPS OR MAKE OTHER NOTES, AS REQUIRED, AT THE END OF EACH PROCESS (5)

f. *POINT OUT (physical).*

Initiating Controller—

(1) Move to appropriate position and manually point to the aircraft's location on the receiving controller's scope.

(2) Wait for indication that the receiving controller is ready.

Receiving Controller—

(3) Indicate when ready. I03(4) Say "Point Out," state aircraft identification, altitude, and route information. (Communicate other pertinent information at this time.)(1)

(5) Look for target and establish radar identification.

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, then all "(c)" parts, etc. Example: Read (6)(a), (7)(a), (8)(a), etc.; then (6)(b), (7)(b), (8)(b), etc.

(6)(a) State aircraft identification. Say, "Point Out Approved," and take action to label target. (2)(3)

(b) State aircraft identification and state restrictions. Say, "Point Out Approved," and take action to label target. (2)(3)(11a)

(c) State aircraft identification. Say, "Handoff, Radar Contact," and take action to label target. (2)(3)

(d) Read back aircraft identification. Say, "Unable." (9a)

(7)(a) Cease pointing.

(b) Cease pointing.

(c) Cease pointing.

(d) Cease pointing.

BOTH CONTROLLERS MARK STRIPS OR MAKE OTHER NOTES, AS REQUIRED. (5)

g. *POINT OUT (interphone)*

Initiating Controller— *Receiving Controller—*

(1) Make interphone connection to receiving controller's position.

(2) Listen to ensure that the interphone circuit is not in use and that the receiving controller is not delivering or receiving a voice message.

(3) State intended receiving controller's position identification, initiating controller's position identification, and line number, if required. Say, "Point Out."

(4) State receiving controller's position identification. (6)

(SEE NOTE (10) FOR ALTERNATE CALL-UP PROCESS)

(5) State aircraft position, identification, altitude and route information. (Communicate other pertinent information at this time.) (1)

(6) Look for target, and establish radar identification.

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, then all "(c)" parts, etc. Example: Read (7)(a), (8)(a), (9)(a), etc.; then (7)(b), (8)(b), (9)(b), etc.

(7)(a) Read back aircraft identification. Say, "Point Out Approved," and state operating initials. Take action to label target. (2)(3)

(b) Read back aircraft identification, and state restrictions. Say, "Point Out Approved," and take action to label target. (2)(3)(11a)

(c) Read back aircraft identification. Say, "Handoff, Radar Contact," state operating initials, and label target. (2)(3)

(d) Read back aircraft identification. Say, "Unable," and state operating initials. (9a)

(8)(a) State operating initials and release the line.

(b) State operating initials and release the line. (4)

(c) State operating initials and release the line.

(d) State operating initials and release the line.

BOTH CONTROLLERS MARK STRIPS OR MAKE OTHER NOTES, AS REQUIRED. (5)

h. *POINT OUT (automated).*

Initiating Controller— *Receiving Controller—*

(1) Take action to place the data block on receiving controller's display. (Ensure that the data block is associated with the appropriate target.) (7)

Initiating Controller—

(2) Make interphone connection to receiving controller's position.

(3) Listen to ensure that the interphone circuit is not in use and that the receiving controller is not delivering a voice message.

(4) State intended receiving controller's position identification, and line number if required. Say, "Point Out."

Receiving Controller—

(5) State receiving controller's position identification. (6)

(SEE NOTE (10) FOR ALTERNATE CALL-UP PROCESS)

(6) State aircraft position, identification, altitude, and route information. (Communicate other pertinent information at this time.) (1)

For ease of reading the following steps, read all parts labelled "(a)" as one integrated process, then read all "(b)" parts as another process, then all "(c)" parts, etc. Example: Read (7)(a), (8)(a), (9)(a), etc.; then (7)(b), (8)(b), (9)(b), etc.

(7)(a) When data block is observed, read back aircraft identification. Say, "Point Out Approved," state operating initials. (2)

(b) Read back aircraft identification and state restrictions. Say, "Point Out Approved," state operating initials. (2)(11a)

(c) Read back aircraft identification. Say, "Handoff, Radar Contact," and operating initials. (2)

(d) Read back aircraft identification. Say, "Unable," and state operating initials. (9a)

(8)(a) State operating initials and release the line.

(b) State operating initials and release the line. (4)

(c) State operating initials, release the line, and where appropriate, take action to place handoff on receiving controller's display. (7)(8)

(d) State operating initials, and release the line. (9)

BOTH CONTROLLERS MARK STRIPS OR MAKE NOTES, AS REQUIRED, AT THE END OF EACH PROCESS. (5)

i. *FOOTNOTES.*

(1) This "other pertinent information" for handoff and point out includes that listed in Chapter 5, Section 4, paragraph 5-64f.

(2) The term "Radar Contact" is prescribed exclusively for handoff; "Point Out Approved" is used exclusively with point out; and "Traffic Observed" is used exclusively with the issuance of traffic with appropriate restrictions.

(3) The phrase "label the target" refers to any action which displays the status of the target. For example, marking a shrimp boat, displaying a full data block, or making a computer entry to change the data block are considered as "labeling the target."

(4) It is a common practice to issue restrictions to ensure separation. It is extremely important that these restrictions are clearly understood.

The controller receiving the restriction should either read it back or ask that it be repeated whenever there is any chance of misunderstanding. Should restrictions become too lengthy or cumbersome, an alternative course of action should be used. The controller receiving any coordinated restriction is responsible for complying with those restrictions.

(5) The prescribed time for marking strips or taking notes is that point in the process when it is known which marks should be made; not earlier, to avoid canceling and remaking the mark; not later, to avoid forgetting to make the mark.

(6) If the controller's stated position identification is not that of the intended controller, then the controller initiating the call says, "Disregard," releases the line, and starts the process over.

(7) The action applies only when the automated capability is available.

(8) If the receiving controller looks at the designated target location and sees no handoff or point out display, he says, "No display." The initiating controller says, "Standby," and corrects the action to send the display to the intended receiving controller, who is holding on the line.

(9)(a) When the receiving controller responds to a handoff or a point out by saying "unable," he means he is unable to accept the handoff or the point out for some reason. When this occurs, he should, if time permits, state the reason; i.e., "radar failure," or "frequency failure," or "traffic," etc.

(b) When the controller receiving the appropriate traffic restrictions states "unable," he means he is unable to comply with the restrictions. Normally, alternate instructions should be issued at this time.

(10) The step-by-step process described in this appendix shows the sequence for initial call up when using a voice page line. In facilities where the 300 system communication equipment operates differently or various types of equipment are used, such as dial lines, ziptones, etc., it is permissible for the sequence to be changed after line connection is made. The change shall be made at the facility level in a facility directive.

Example: The receiving controller, when detecting the override alert (click, ziptone, etc.), shall answer the initiating controller, when ready, by stating sector I.D.

Regardless of the sequence chosen by a facility, the following items are required for all interphone contacts:

(a) Both controllers state position identification.

(b) Conduct coordination and response in accordance with this handbook and appendix.

(c) Both controllers terminate interphone contact with operating initials.

(11) The traffic action is established to clarify and standardize a condition that occurs in the system and has been referred to as many different things. This action is a exception to the routine and in many facilities may not be needed or used at all.

Following are examples where issuing traffic with appropriate restrictions is being used in the system:

(a) Traffic in response to a handoff or point out—

Controller A calls Controller B with handoff or point out. Controller B elects to respond by issuing traffic with appropriate restrictions and accepts the handoff or approves the point out.

Phraseology:

Controller B: TRAFFIC, (aircraft position), (aircraft identification), (altitude information), (appropriate restrictions; e.g., turn in reference to ....).

Controller A: TRAFFIC OBSERVED.

or

UNABLE (see Note 9(a)(b)), (operating initials).

Controller B: RADAR CONTACT

or

POINT OUT APPROVED, (operating initials).

The above process is to be inserted into the step-by-step for handoff or point out in the step where the receiving controller states restrictions.

(b) Initiating traffic in anticipation of a handoff or point out—

A slow aircraft overflying approach control airspace may require the departure controller to have departures level off underneath. However, in anticipation of the departure handoff, the center controller initiates a call to the approach control, transfers the radar identification by issuing traffic, and gives appropriate restrictions for the departures to continue climb in reference to the traffic.

Phraseology:

Initiating Controller: TRAFFIC, (aircraft position), (aircraft identification), (altitude information), (appropriate restrictions; e.g., climb reference....).

Receiving Controller: TRAFFIC OBSERVED

or

UNABLE (see Note 9(a)(b)), (operating initials).

Initiating Controller: (operating initials).

(c) In conjunction with a request for control release of an aircraft—

Controller A gives Controller B an early handoff on AA10 and transfers radio communications. Subsequently, Controller B requests control of AA10 while the aircraft is still in Controller A's airspace. Controller A relinquishes control of AA10 by issuing appropriate "traffic" restrictions.

Phraseology:

Controller A: TRAFFIC, (aircraft position), (aircraft identification), (aircraft altitude information), (appropriate restrictions; e.g., your control to descend reference....).

Controller B: TRAFFIC OBSERVED.

or

UNABLE (see Note (9)(b)), (operating initials).

Controller A: (operating initials).

Take action to label the target or to display the data block on the appropriate controller's display.

(d) In order to clarify the meaning of phraseology often used to issue restrictions in conjunction with "traffic," the following phrases are explained:

(i) "In reference to..." or "Your control" stated alone without stating the terms "climb," "descend," or "turn" means that no restrictions are intended; i.e., "anything you want to do with that aircraft is approved within my airspace." If any restrictions are intended, you must specifically state the restrictions.

(ii) "Climb in reference to..." or "Your control to climb" means that approval is granted for climb only; descents and turns are not approved.

(iii) "Descend in reference to ..." or "Your control to descend" means that approval is granted for descent only; climbs and turns are not approved.

(iv) "Turn in reference to ..." or "Your control to turn" means that approval is granted for turns (heading changes) only; climbs and descents are not approved.

(v) For brevity in all of the above, the phrase "in reference to" may be shortened to "reference" or "respect."

☆U.S. GOVERNMENT PRINTING OFFICE: 1985 461 828 10015

Ai 7/3/984/guide/ch.1

NEWARK PUBLIC LIBRARY

FEB 1 1985

U. S. GOVT. PUBS.
DEPOSITORY 376

BRIEFING GUIDE

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Distribution: A-WX(AT)-3; A-FAT-3,4,5,6,7(LTD); A-FAT-1,2,8(MAX); ATO-210(30);AAC-930(10) AGC-23(1)

Initiated by: ATO-300

TD4.308:

Handbook: 7110.65D
Change: 1
Effective: February 14, 1985

Handbook Change Briefing Sheet

1. Paragraph Number and Title:

2-59, CONTROL SYMBOLOGY

2. Background:

This handbook change was initiated as a result of a recommendation received from the National Transportation Safety Board. The recommendation was to modify flight strip marking procedures pertaining to "wrong altitude for direction of flight" assignments to uniformly require inclusion of a notation regarding the status of the transfer of relevant information to other controllers.

Although present strip marking procedures require controllers to circle, in red, information forwarded, this change specifically addresses "wrong altitude for direction of flight" coordination.

3. Change:

	OLD		NEW
o(red)	EN ROUTE: Information forwarded (Circle, in red, the time (minutes) and altitude when a flight plan or estimate is forwarded. Also, circle, in red, revised information forwarded. Use this method in both inter-center and intra-center coordination.)	o(red)	EN ROUTE: Information or revised information forwarded (Circle, in red, inappropriate altitude/flight level for direction of flight or other control information when coordinated. Also circle, in red, the time (minutes) and altitude when a flight plan or estimate is forwarded. Use this method in both inter-center and intra-center coordination.)

4. Explanation of Change:

Emphasizes the requirement to ensure that flight strip marking procedures are both standardized and adhered to in order to provide for timely and complete transfer of relative information such as "wrong altitude for direction of flight" assignments.

Handbook: 7110.65D
Change: 1
Effective: 2/14/85

Handbook Change Briefing Sheet

1. Paragraph Number and Title

Chapter 2, Section 4, Paragraph 2-72, ENSURING ACKNOWLEDGEMENT

2. Background

This change proposal was initiated as a result of a recommendation to modify paragraph 233 to make the controller accountable for ensuring that pilots correctly acknowledge altitude clearance information. It was believed that ATC personnel generally believe that they are accountable, but nowhere does it say so. Most respondents agree, but 3 correctly stated that controllers should be accountable for ensuring acknowledgement of any ATC clearance, instruction, or procedure, not just altitude clearance. Therefore, the below modified version of the proposal states specifically that controllers are accountable for ensuring such acknowledgement.

3. Change

OLD	NEW
None	2-72. ENSURING ACKNOWLEDGEMENT a. When issuing information, clearances, or instructions, ensure acknowledgement by the pilot. b. If altitude, heading, or other items are read back by the pilot, ensure the readback is correct. If incorrect, distorted, or incomplete, make correction as appropriate.

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memorandum

Subject: **ACTION:** Change to FAA Handbook 7110.65/AIM, Pilot/Controller Glossary

Reply to
Attn of Peacock: 426-8532

Add the following to the Pilot/Controller Glossary in the next revision to FAA Handbook 7110.65/AIM:

> ULTRALIGHT VEHICLE - An aeronautical vehicle operated for sport or recreational purposes which does not require FAA registration, an airworthiness certificate, nor pilot certification. They are primarily single occupant vehicles, although some two-place vehicles are authorized for training purposes. Operation of an ultralight vehicle in certain airspace requires authorization from ATC. (See FAR 103)

#

Ai 7/3/984/guide/ch. 3

NEWARK PUBLIC LIBRARY
SEP 20 1985
U. S. GOVT. PUBS.
DEPOSITORY 376

BRIEFING GUIDE

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Distribution: A-W(AT/TO/TR)-3; A-FAT-1,2,8(MAX) FAT-3,4,5,6,7(LTD); ATO-210(30 copies); AAC-930 (10 copies); AGC-23 (1 copy); ZAT-423 (ALL)

Initiated by: ATO-300

TD 4.308:

Handbook: 7110.65D
Change: 3
Effective: September 26, 1985

Handbook Change Briefing Sheet

1. PARAGRAPH NUMBERS AND TITLES:

1-20 Word Meanings

5-113 Successive or Simultaneous Departures

5-115 Departures and Arrivals on Parallel or Nonintersecting Diverging Runways

6-10 Minima on Diverging Courses

2. BACKGROUND:

The Air Traffic Controllers' Handbook is frequently challenged concerning its relevance to helicopter operations. Since many handbook procedures are written in terms of fixed-wing aircraft and/or runway relationships, at times their use seems awkward or inappropriate. This is especially true where helipads have been established to prevent runway congestion and to reduce helicopter ground taxi time. This configuration of departure/arrival activity is generating many inquiries by air traffic managers on procedures application.

Four National Airspace Review Task Groups have been designated to review current procedures and recommend appropriate changes for the conduct of helicopter operations. Three of their recommendations are addressed in this change to the handbook and primarily concern initial separation standards in the terminal environment. The intent is to clarify the methods of applying existing procedures to air traffic environments containing helicopter only or a mixture of helicopter and fixed-wing operations. This change contains no reductions in minima. It does, however, provide an entirely new method of applying separation standards to helicopters by considering a helipad and the helicopter's takeoff/landing course as a runway in discussions of separation standards.

3. CHANGE:

CHANGE TO PARAGRAPH 1-20

OLD	NEW
1-20 WORD MEANINGS	1-20 WORD MEANINGS (Same)
As used in this manual:	As used in this manual: (Same)
a. Shall, or an action verb in the imperative sense, means a procedure is mandatory.	a. (Same)

1-20 Examples.-

Issue an alternative clearance.

Authorize the aircraft to taxi.

The transferring controller shall forward these data to the receiving controller.

Do not clear an aircraft to land or takeoff from a closed runway.

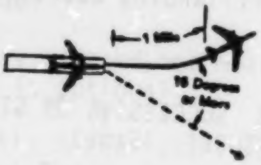
b. Should means a procedure is recommended.	b. (Same)
c. May or need not means a procedure is optional.	c. (Same)
d. Will means futurity, not a requirement for application of a procedure.	d. (Same)
e. Singular words include the plural.	e. (Same)
f. Plural words include the singular.	f. (Same)
g. Aircraft means the airframe, crew members, or both.	g. (Same)
h. Approved separation means separation in accordance with the applicable minima in this manual.	h. (Same)
i. Altitude means altitude mean sea level, flight level, or both.	i. (Same)
j. Miles means nautical miles unless otherwise specified, and means statute miles in conjunction with visibility.	j. (Same)
k. Course, Bearing, Heading, and Wind Direction information shall always be magnetic unless specifically stated otherwise.	k. (Same)

l. Time when used in the context of a clock reading is the hour in Greenwich Mean Time (GMT) or the local equivalent, as appropriate, and the minutes change to the next minute is made at the minute plus 30 seconds, except time checks are given to the nearest quarter minute.	l. (Same)
	m. "Runway" means the runway used by aircraft (See Pilot/Controller Glossary) and in discussions of separation standards is applicable to helipads with accompanying takeoff/landing courses.

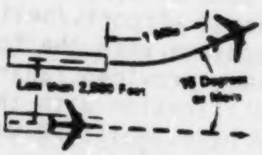
c. CHANGE TO PARAGRAPH 5-113

5-113 SUCCESSIVE OR SIMULTANEOUS DEPARTURES	5-113 SUCCESSIVE OR SIMULTANEOUS DEPARTURES (Same)
TERMINAL	TERMINAL (Same)
Separate aircraft departing from the same airport or adjacent airports in accordance with the following minima provided radar identification with the aircraft will be established within 1 mile of the takeoff runway end and courses will diverge by 15 degrees or more.	Separate aircraft departing from the same airport/heliport or adjacent airports/heliports in accordance with the following minima, provided radar identification with the aircraft will be established within 1 mile of the takeoff runway end/helipad and courses will diverge by 15 degrees or more.
5-113 Note. - Order 8260.19, Flight Procedures and Airspace, establishes guidelines for IFR departure turning procedures which assumes a climb to 400 feet before a turn is commenced. Order 8290.3, TERPS, the ILS missed approach criteria require a straight climb of 400 feet be specified where turns greater than 15 degrees are required.	5-113 Note. 1. - Order 8260.19, Flight Procedures and Airspace, establishes guidelines for IFR departure turning procedures which assumes a climb to 400 feet before a turn is commenced. Order 8290.3, TERPS, the ILS missed approach criteria requires a straight climb of 400 feet be specified where turns greater than 15 degrees are required.
	5-113 Note. 2. - Consider known aircraft performance characteristics when applying initial separation to successive departing aircraft.

a. Between aircraft departing the same runway, or parallel runways separated by less than 2,500 feet - 1 mile if courses diverge immediately after departure.


1 Mile
15 Degrees or More

5-113a Illustration 1


1 Mile
Less than 2,500 Feet
15 Degrees or More

5-113a Illustration 2

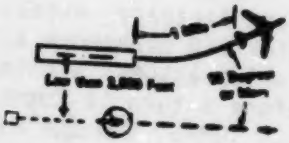
5-113a Note. - This procedure does not apply when Category I or II aircraft are taking off from an intersection on the same runway behind a preceding departing Category III aircraft or when aircraft are departing behind a heavy jet.

5-113 Note. 3. - When one or both of the departure surfaces is a helipad, use the takeoff course of the helicopter as a reference, comparable to the centerline of a runway and the helipad center as the threshold.

a. Between aircraft departing the same runway/helipad , or parallel runways/helicopter takeoff courses separated by less than 2,500 feet - 1 mile if courses diverge immediately after departure.

5-113a Illustration 1 (Same)

5-113a Illustration 2 (Same)


1 Mile
Less than 2,500 Feet
15 Degrees or More

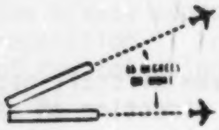
5-113a Illustration 3

5-113a Note - (Same)

5-113a Reference. - Intersection Takeoff Separation, 3-108; Intersection Takeoff, 3-107; Minima, 5-72.

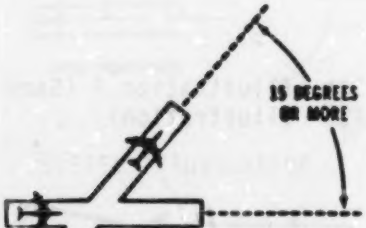
b. Between aircraft departing from diverging runways:

(1) Nonintersecting runways - Authorize simultaneous takeoffs if runways diverge by 15 degrees or more.



5-113b(1) Illustration

(2) Intersecting runways which diverge by 15 degrees or more - Authorize takeoff of a succeeding aircraft when the preceding aircraft has passed the point of runways intersection. When applicable, apply the procedure in 3-104.



5-113b(2) Illustration

5-113a Reference. - (Same)

b. (same)

(1) (Same)

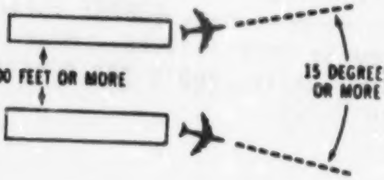
5-113b(1) Illustration (Same)

(2) Intersecting runways and/or helicopter takeoff courses which diverge by 15 degrees or more - Authorize takeoff of a succeeding aircraft when the preceding aircraft has passed the point of runway and/or takeoff course intersection. When applicable, apply the procedure in 3-104.

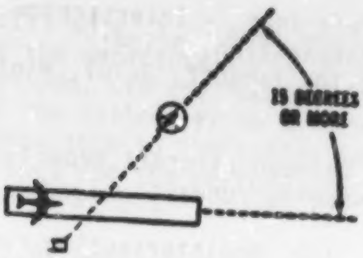
5-113b(2) Illustration 1 (Same as 5-113b(2) Illustration)

5-113b(2) Note. - This procedure does not apply when aircraft are departing behind a heavy jet.

c. Between aircraft departing in the same direction from parallel runways - Authorize simultaneous takeoffs if the centerlines are separated by at least 2,500 feet and courses diverge immediately after departure.


2,500 FEET OR MORE
15 DEGREES OR MORE

5-113c Illustration

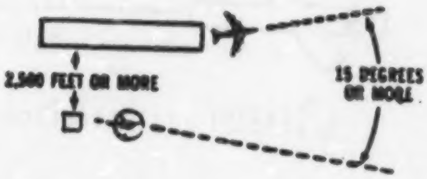

15 DEGREES OR MORE

5-113b(2) Illustration 2

5-113b(2) Note. - (Same)

c. Between aircraft departing in the same direction on parallel runways/helicopter takeoff courses - Authorize simultaneous takeoffs if the centerlines/takeoff courses are separated by at least 2,500 feet and courses diverge by 15 degrees or more immediately after departure.

5-113c Illustration 1 (Same as 5-113c Illustration)


2,500 FEET OR MORE
15 DEGREES OR MORE

5-113c Illustration 2

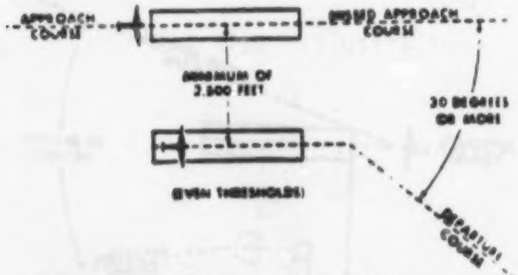
d. CHANGE TO PARAGRAPH 5-115

5-115 DEPARTURES AND ARRIVALS ON PARALLEL OR NONINTERSECTING DIVERGING RUNWAYS

TERMINAL

Authorize simultaneous operations between an aircraft on a runway and an aircraft on final approach to another parallel or nonintersecting diverging runway if the departure course diverges immediately by at least 30 degrees from the missed approach course until separation is applied and provided one of the following conditions are met:

a. When parallel runway thresholds are even, the runway centerlines are at least 2,500 feet apart.


APPROACH COURSE
MISSED APPROACH COURSE
MINIMUM OF 2,500 FEET
30 DEGREES OR MORE
(EVEN THRESHOLDS)
DEPARTURE COURSE

5-115a Illustration

5-115 DEPARTURES AND ARRIVALS ON PARALLEL OR NONINTERSECTING DIVERGING RUNWAYS

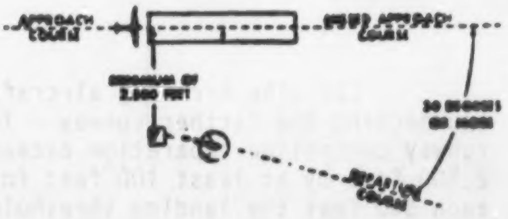
TERMINAL

(Same)

5-115 Note - When one, or both, of the takeoff/landing surfaces is a helipad, consider the helicopter takeoff course as the runway centerline and the helipad center as the threshold.

a. (Same)

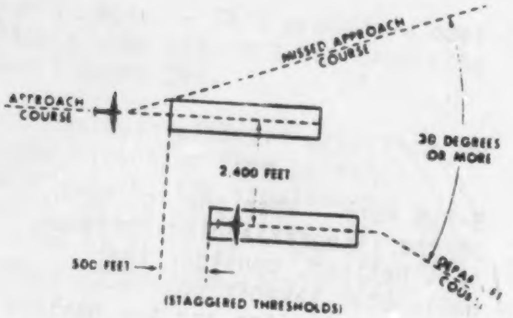
5-115a Illustration 1 (Same as 5-115a Illustration)


APPROACH COURSE
MISSED APPROACH COURSE
MINIMUM OF 2,500 FEET
30 DEGREES OR MORE
DEPARTURE COURSE

5-115 a. Illustration 2

b. When parallel runway thresholds are staggered and:

(1) The arriving aircraft is approaching the nearer runway - The centerlines are at least 1,000 feet apart and the landing thresholds are staggered at least 500 feet for each 100 feet less than 2,500 the centerlines are separated.


MISSED APPROACH COURSE
APPROACH COURSE
30 DEGREES OR MORE
2,400 FEET
500 FEET
(STAGGERED THRESHOLDS)
DEPARTURE COURSE

5-115b(1) Illustration

5-115b(1) Note. - In the event of a missed approach by a heavy jet, apply the procedures in 3-108 or ensure that the heavy jet does not overtake an aircraft departing from the adjacent parallel runway.

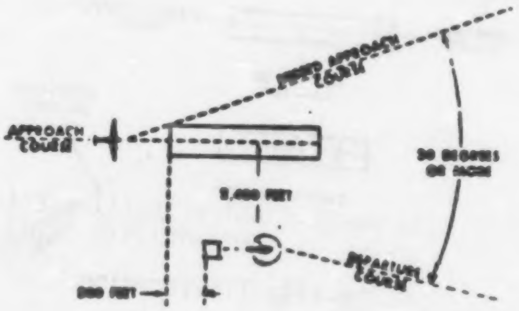
(2) The arriving aircraft is approaching the farther runway - The runway centerline separation exceeds 2,500 feet by at least 100 feet for each 500 feet the landing thresholds are staggered.

b. (Same)

(1) (Same)

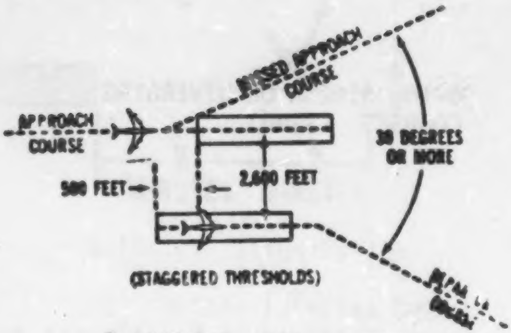
5-115b(1) Illustration 1 (Same as 5-115b (1) Illustration)

5-115b(1) Note. - (Same)


MISSED APPROACH COURSE
APPROACH COURSE
30 DEGREES OR MORE
2,400 FEET
500 FEET
DEPARTURE COURSE

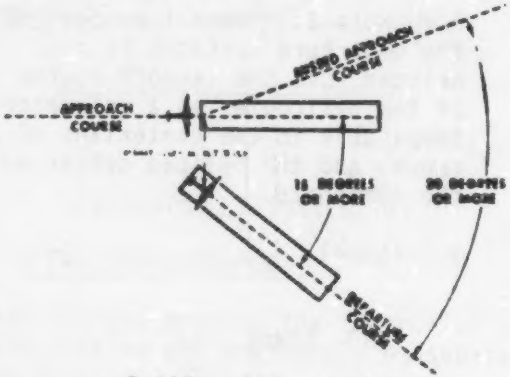
5-115b(1) Illustration 2

(2) (Same)


MISSED APPROACH COURSE
APPROACH COURSE
30 DEGREES OR MORE
500 FEET
2,000 FEET
(STAGGERED THRESHOLDS)
DEPARTURE COURSE

5-115b(2) Illustration

c. When nonintersecting runways diverge by 15 degrees or more and runway edges do not touch.


MISSED APPROACH COURSE
APPROACH COURSE
15 DEGREES OR MORE
30 DEGREES OR MORE
DEPARTURE COURSE

5-115c Illustration

5-115b(2) Illustration (Same)

c. (Same)

5-115c Illustration (Same)

5-115d - When the aircraft on takeoff is a helicopter, hold the helicopter until visual separation is possible or apply the separation criteria in a, b, or c above.

f. CHANGE TO PARAGRAPH 6-10

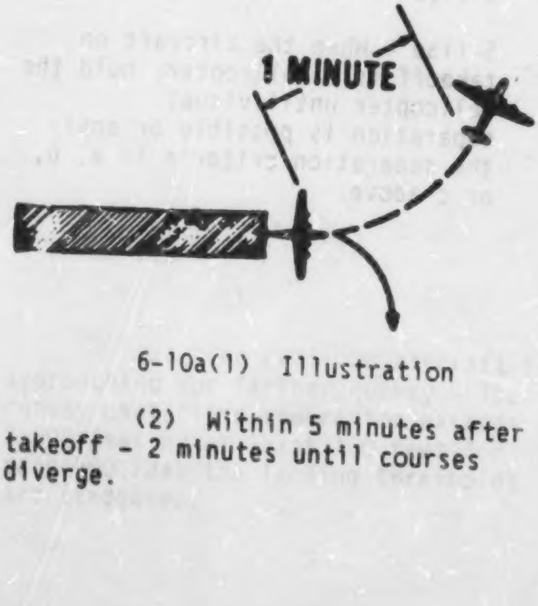
6-10 MINIMA ON DIVERGING COURSES

Separate aircraft that will fly courses diverging by 45 degrees or more after departing the same or adjacent airports by use of one of the following minima:

6-10 Note - Consider known aircraft performance characteristics when applying initial separation to successive departing aircraft.

a. When aircraft will fly diverging courses:

(1) Immediately after takeoff - 1 minute until courses diverge.



6-10a(1) Illustration

(2) Within 5 minutes after takeoff - 2 minutes until courses diverge.

6-10 MINIMA ON DIVERGING COURSES (Same)

6-10 Note 1. - Consider known aircraft performance characteristics when applying initial separation to successive departing aircraft.

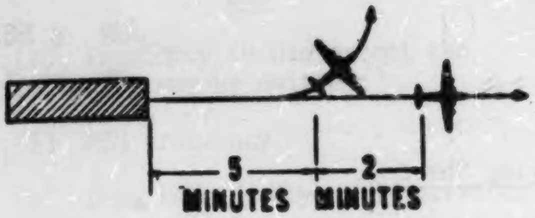
6-10 Note 2. - When 1 or both of the departure surfaces is a helipad, use the takeoff course of the helicopter as a reference, comparable to the centerline of a runway and the helipad center as the threshold.

a. (Same)

(1) (Same)

6-10a(1) Illustration (Same)

(2) (Same)

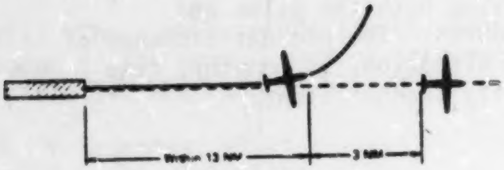


6-10a(2) Illustration

6-10a(2) Illustration (Same)

(3) Within 13 miles DME after takeoff - 3 miles until courses diverge.

(3) (Same)



6-10a(3) Illustration

6-10a(3) Illustration (Same)

4. OPERATIONAL CHANGE:

These changes provide the controller with a reference comparable to the runway centerline to use when applying separation criteria to helicopters departing from helipads.

Walter H. Mitchell

Walter H. Mitchell
Acting Manager, Procedures Division, ATO-300

Handbook: 7110.65
Change: 3
Effective: September 26, 1985

JUN 6 198

Handbook Change Briefing Sheet

1. Paragraph Number and Title.

2-17 Radio Communications Transfer.

2. Background.

There is presently no standardized phraseology to allow a controller working combined frequencies to request a pilot to change his frequency to the same controller without having both the pilot and controller go through initial call-up procedures. The present exchange of radio communications transfer, in this type situation, is lengthy, time consuming, and interferes with higher priority transmissions.

3. Change.

OLD	NEW
2-17 RADIO COMMUNICATIONS TRANSFER	2-17 RADIO COMMUNICATIONS TRANSFER
a. Transfer radio communications before an aircraft enters the receiving controller's area of jurisdiction unless otherwise coordinated.	a. No change.
b. Transfer radio communications by specifying the following:	b. No change.
2-17b Note. - Radio communications transfer procedures may be specified by letter of agreement or contained in the route description of a MTR and as published in the DOD Planning AP/1B (AP/3).	
(1) The facility name or location name and terminal function to be contacted. TERMINAL: Omit the location name when transferring communications to another controller within your facility except as required in 5-137.	

OLD

NEW

(2) Frequency to use except the following may be omitted:

(a) FSS frequency.

(b) Departure frequency if previously given or published on a SID chart for the procedure issued.

(c) TERMINAL:

(i) Ground or local control frequency if in your opinion the pilot knows which frequency is in use.

(ii) The numbers preceding the decimal point if the ground control frequency is in the 121 MHz bandwidth.

2-17b Examples. -

"Contact tower."

"Contact ground."

"Contact ground point seven."

"Contact ground, one two zero point eight."

"Contact Huntington Radio."

"Contact departure."

"Contact Los Angeles Center, one two three point four."

OLD

(3) Time, fix, altitude, or specifically when to contact a facility. You may omit this when compliance is expected upon receipt.

2-17b(3) Note. - The AIM, paragraph 340, informs pilots that they are expected to maintain a listening watch on the transferring controller's frequency until the time, fix, or altitude specified.

Phraseology:

CONTACT (facility name or location name and terminal function), (frequency).

If required,

AT (time, fix, or altitude).

c. Reletter as subparagraph d. below.

NEW

c. In situations where a sector has multiple frequencies or when sectors are combined using multiple frequencies, and the aircraft will remain under your jurisdiction, transfer radio communication by specifying the following:

Phraseology:

(Identification) change to my frequency (state frequency).

2-17c. Example. - "United 222 change to my frequency 123.4."

2-17c. Reference. - AIM, paragraph 192.d.(2)

OLD	NEW
d. Avoid issuing a frequency change to helicopters known to be single piloted during air-taxiing, hovering, or low-level flight. Whenever possible, relay necessary control instructions until the pilot is able to change frequency.	d. No change from the old subparagraph c.
2-17d Note. - Most light helicopters are flown by one pilot and require the constant use of both hands and feet to maintain control. Although flight control friction devices assist the pilot, changing frequency near the ground could result in inadvertent ground contact and consequent loss of control. Pilots are expected to advise ATC of their single pilot status if unable to comply with a frequency change.	
2-17d. Reference. - AIM.	
d. Relettered as subparagraph e. below.	e. No change from the old subparagraph d.
e. In situations where the controller does not want the pilot to change frequency but the pilot is expecting or may want a frequency change, use the following phraseology.	
Phraseology:	
REMAIN THIS FREQUENCY.	

4. Explanation of Major Changes (7110.65).

The proposed addition will eliminate unnecessary verbiage for the controller and pilot while maintaining clarity of the message. It provides for standardized phraseology to be used in large geographical sectors and when sectors are combined which require the use of multiple frequencies. (Walden, ATO-330.3)

Walter H. Mitchell

Walter H. Mitchell
Acting Manager, Procedures Division, ATO-300

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memorandun

Subject: ACTION: Editorial change to Handbook 7110.65D

Date: 2 8 MAR 1985

Walter H. Mitchell

From: Walter H. Mitchell
Acting Manager, Procedures Division, ATO-300

Reply to
Attn. of: Price:426-8511

To: ATO-200

An employee suggestion has pointed out an erroneous phraseology example in Handbook 7110.65, paragraph 2-85.g. The example reads "Wind two seven zero at one five peak gusts three five." The term "peak gusts" is not in compliance with Federal Meteorological Handbooks.

Request paragraph 2-85.g. example two be changed to read:

"Wind two seven zero at one five gusts three five"

#

Handbook: 7110.65D
Change: 3
Effective: Sep 26, 1985

Handbook Change Briefing Sheet

1. Paragraph Number and Title;

3-84 ILS Critical Areas

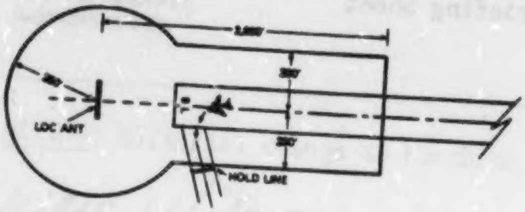
2. Background:

Correspondence has been received from the field indicating there is an apparent conflict between FAA Order 6750.16 and FAA Order 7110.65 regarding localizer critical area dimensions.

FAA Order 6750.16 defines the critical area dimensions for each type of localizer antenna. This order is to be used for siting the antennas and for development of each particular critical area. HB 7110.65 covers localizer critical areas in a discussion of Taxi and Ground Movement Procedures. Included in this discussion is a drawing of a typical critical area. Because this is the only representation in the Controller's Handbook and there is currently no reference to any other documents on the subject, some confusion exists. To clarify the situation, a Note should be added which directs the readers attention to the appropriate engineering handbook for the actual dimensions of each specific critical area.

3. Change:

Old	New
3-84c. Localizer Critical Area-	3-84c. Localizer Critical Area (Same)
(1) When conditions are less than reported ceiling 800 feet and/or visibility 2 miles, do not authorize vehicle or aircraft operations in or over the area when an arriving aircraft is between the ILS FAF and the airport, except:	(1) (Same)
(a) A preceding arriving aircraft on the same or another runway that passes over or through the area while landing or exiting the runway.	(a) (Same)

(b) A preceding departing aircraft or missed approach on the same or another runway that passes through or over the area.	(b) (Same)
 3-84c(1) Illustration	3-84c(1) Illustration (same) 3-84c(1) Note-The principle purpose of this graphic is to illustrate the parameters of operations within the critical area, not to define the actual limits of the area. Refer to FAA Order 6750.16 for the dimensions of the critical area for each specific antenna.
(2) In addition to (1) above, when conditions are reported ceiling less than 200 feet and/or RVR 2,000 or less (USAF: 1/2 mile if no RVR), do not authorize vehicle or aircraft operations in or over the area when an aircraft is inside the ILS MM (USAF: 1 NM from TD if no MM).	(2) (Same)

4. Operational Change:

This change is editorial in nature. It is made to reduce confusion that resulted from the current wording and illustration.

Handbook: 7110.65D

Change: 3

Effective: September 26, 1985

Handbook Change Briefing Sheet

1. Paragraph Number and Title:
4-40 FLIGHT DIRECTION

2. Background:
In September 1984 a task group met at FAA HQ to review and revise Oceanic Air Traffic Control Handbook 7110.83. The group identified several situations where aircraft transitioning to/from oceanic airspace, where composite separation is authorized, may be required by ATC to fly significant distances in domestic/offshore airspace at altitudes other than those found in Paragraph 4-40 of FAAH 7110.65D (e.g. wrong altitude for direction of flight or at altitudes such as FL300, FL320, FL340, etc.). On January 11, 1985, an Air Traffic Control Document Change Proposal, ATO-330-84-18, concerning Paragraph 4-40 was distributed for review.

There were 31 responses to the proposal. These included 6 recommendations, 4 of which were incorporated into the NEW Paragraph 4-40. Those incorporated include 1) adding the word "cardinal" under the "Assign" column for aircraft to/from oceanic airspace; 2) showing altitude examples for aircraft transitioning to/from oceanic airspace; 3) adding the word "transitioning" under the "Aircraft Operating" column for aircraft to/from oceanic airspace; and 4) placing all altitude examples in a column to the right of the "Assign" column. Additionally, the words "including those above FL290" were added under the "Assign" column for aircraft transitioning to/from oceanic airspace.

3. Change:
See Attachment 1

4. Operational Change:
Authorizes course and altitude assignment information for aircraft operating in transition to/from oceanic airspace where composite separation is applied. "Examples" for Table 4-40 are now placed in a column next to the "Assign" column making them more descriptive.

5. Editorial Change:
In Table 4-40 the line between the rows for aircraft operating "Below 3,000 feet above surface" and "Below FL290" is extended across all four columns to make their division more distinctive.

Willard H. Reazin
Manager, Procedures Division, ATO-300

Attachment 1

OLD

4-40 FLIGHT DIRECTION

Clear aircraft at altitudes according to the Table.

4-40 Table. — Altitude Assignment

Aircraft Operating	*On course degrees magnetic*	*Assign*
Below 3,000 feet above surface	Any course	Any altitude
Below FL 290	0 through 179	Odd cardinal altitudes or flight levels at intervals of 2,000 feet
	180 through 359	Even cardinal altitudes or flight levels at intervals of 2,000 feet
At or above FL 290	0 through 179	Odd cardinal flight levels at intervals of 4,000 feet beginning with FL 290
	180 through 359	Odd cardinal flight levels at intervals of 4,000 feet beginning with FL 310
Within an ALTRV	Any course	Any altitude or flight level

4-40 Examples. —

3,000, 5,000, FL 250, FL 270.

4,000, 6,000, FL 240, FL 260.

FL 290, FL 330, FL 370.

FL 310, FL 350, FL 390.

NEW

4-40 FLIGHT DIRECTION

Clear aircraft at altitudes according to the Table.

4-40 Table. — Altitude Assignment

Aircraft Operating	*On course degrees magnetic*	*Assign*	Examples
Below 3,000 feet above surface	Any course	Any altitude	
Below FL 290	0 through 179	Odd cardinal altitudes or flight levels at intervals of 2,000 feet	3,000, 5,000 FL250, FL270
	180 through 359	Even cardinal altitudes or flight levels at intervals of 2,000 feet	4,000, 6,000 FL240, FL260
At or above FL 290	0 through 179	Odd cardinal flight levels at intervals of 4,000 feet beginning with FL 290	FL290, FL330 FL370
	180 through 359	Odd cardinal flight levels at intervals of 4,000 feet beginning with FL 310	FL310, FL350 FL390
Within an ALTRV	Any course	Any altitude or flight level	
In transition to/from Oceanic airspace where composite separation is authorized	Any course	Any odd or even cardinal flight level including those above FL290	FL280, FL290 FL300, FL310 FL320 FL330 FL340

HANDBOOK: 7110.65D
CHANGE: 4
EFFECTIVE: January 16, 1986

1. Paragraph Number and Title

Paragraph 5-13, Radar Service Termination

2. Background

Recent employee inquiries regarding clarification of FAAH 7110.65D, paragraph 5-13, indicates a need to revise the existing procedural responsibilities.

Where adequate radar coverage exists, radar service should be employed to the maximum extent practicable. It is our intent to maintain this policy through the use of certified tower radar displays and associated operational procedures as outlined in FAAH's 7110.65D and 7210.3G.

Paragraph 5-13b was written before tower radar displays became relatively common equipment and because of that, may not adequately address those situations where elements of radar responsibilities have been operationally transferred from the approach control function to the tower function. The intent of this paragraph was to avoid frequency congestion which could exist if controllers were required to advise every aircraft receiving radar service when those services are terminated. The practical application of this procedure is not commensurate with current guidelines and, therefore, requires modification.

3. Change

OLD	NEW
5-13 RADAR SERVICE TERMINATION	5-13 RADAR SERVICE TERMINATION
a. Inform aircraft when radar service is terminated.	a. Inform aircraft when radar service is terminated.
Phraseology:	Phraseology:
RADAR SERVICE TERMINATED (non-radar routing, if required).	RADAR SERVICE TERMINATED (non-radar routing, if required).
b. Radar service is automatically terminated and the aircraft need not be advised of termination in the following cases:	b. Radar service is automatically terminated and the aircraft need not be advised of termination when:

5-13 Note. - Termination of radar monitoring when conducting simultaneous ILS approaches is prescribed in 5-126h(3). Termination of radar monitoring where PAR equipment is used to monitor approaches is prescribed in 5-182e.	5-13 Note. - Termination of radar monitoring when conducting simultaneous ILS approaches is prescribed in 5-126h(3). Termination of radar monitoring where PAR equipment is used to monitor approaches is prescribed in 5-182e.
(1) An aircraft cancels its IFR flight plan, except within a TCA, TRSA, or where Stage II service is provided.	(1) An aircraft cancels its IFR flight plan, except within a TCA, TRSA, ARSA, or where Stage II service is provided.
(2) An aircraft making an instrument approach has landed or the tower sights the aircraft, whichever occurs first.	(2) An aircraft conducting an instrument, visual, or contact approach has landed or has been instructed to change to advisory frequency.
(3) An aircraft conducts a visual approach or contact approach and is advised to contact the tower.	5-13(2) Note. - At tower controlled airports where radar coverage does not exist to the runway, arriving aircraft shall be informed when radar service is terminated.
(4) TERMINAL: An arriving VFR aircraft, receiving radar services, is advised to contact the tower.	(3) TERMINAL: An arriving VFR aircraft receiving radar service to a tower controlled airport within a TCA, TRSA, ARSA, or where Stage II service is provided, has landed OR to all other airports, is instructed to change to tower or advisory frequency.
(5) TERMINAL: At the completion of a radar approach.	(4) TERMINAL: An aircraft completes a radar approach.

4. Operational Change

This change ensures guidelines are commensurate with the intent of practical application of this procedure.

Walter H. Mitchell
Acting Manager, Procedures Division, ATO-300

U.S. Department
of Transportation

**Federal Aviation
Administration**

Memorandum

Subject: ACTION: Editorial change to Handbook 7110.65D

Date: 9 APR 1985

Walter H. Mitchell

From: Walter H. Mitchell
Acting Manager, Procedures Division, ATO-300

Reply to Attn. of: Price:426-8511

To: ATO-200

A recent FAB recommendation pointed out an inconsistency in the wording of paragraph 5-75.a. of Handbook 7110.65. The present paragraph uses the wording "within 40 miles" and "beyond 40 miles." All other paragraphs use the wording "less than 40 miles" and "40 miles or more".

Request paragraph 5-75.a.(1) and (2) be changed to read:

(1) When less than 40 miles from the antenna - 3 miles

(2) When 40 miles or more from the antenna - 5 miles

#

JUN 5 1985

HANDBOOK: 7110.65D
CHANGE: 3
EFFECTIVE: September 26, 1985

Handbook Change Briefing Sheet

1. PARAGRAPH NUMBER AND TITLE:

5-102 MINIMA

2. BACKGROUND:

FAAH 7110.65D paragraph 5-102 (Minima) prescribes a speed minimum (reciprocating and turboprop aircraft) of 150 knots when the aircraft are within 20 miles of the runway. However, no minimum is prescribed for those aircraft when they are more than 20 miles away.

In 1978, ATO-320 circulated proposal AAT-320-78-1 that (among other things) changed the speed minima in FAAH 7110.65A paragraph 822. The final disposition of the proposal was reflected in Change 4 to the handbook. Prior to the change there was a general speed minimum for all multi-engine aircraft operating below 10,000 feet that appears to have been omitted when Change 4 was compiled.

3. CHANGE:

OLD	NEW
(2) Reciprocating engine and turboprop aircraft - A speed not less than 150 knots when the aircraft is within 20 flying miles of the runway threshold of the airport of intended landing.	(2) Reciprocating engine and turboprop aircraft - A speed not less than 200 knots; except when the aircraft is within 20 flying miles of the runway threshold of the airport of intended landing, a speed not less than 150 knots.

4. OPERATIONAL CHANGE

This change reinstates a speed minima that had been dropped from the handbook as a result of an administrative error.

Walter H. Mitchell

Walter H. Mitchell
Acting Manager, Procedures Division, ATO-300

U.S. Department
of Transportation
Federal Aviation
Administration

Memorandum

Subject: ACTION: Change to AIM and the Pilot/ Controller Glossary.

Date: 2 APR 1985

Walter H. Mitchell

From: Walter H. Mitchell
Acting Manager, Procedures Division, ATO-300

Reply to Attn. of: Dean: 426-8630

To: Manager, Airspace Rules and Aeronautical Information Division, ATO-200

1. Paragraph Number and Title.

298., Flight Plan - IFR Flights.

2. Background.

The development and increased use of area navigation (RNAV) systems has created a need to identify differing airborne equipment capabilities, which is not accomplished by the flight plan equipment suffix. As a result, there is a growing incidence of pilot/controller misunderstanding and confusion regarding the issuance and acceptance of RNAV clearances, and these changes are made to add clarification.

3. Change.

Revise the AIM, Chapter 4, Section 5, subparagraph 298.d., as follows:

add:

> (5) To be certified for use in the National Airspace System, RNAV equipment must meet the specifications outlined in AC 90-45A. The pilot is responsible for variations in equipment capability and must advise ATC if he cannot accept an RNAV clearance as specified. The controller need only be concerned that the aircraft is RNAV equipped. If the flight plan equipment suffix denotes RNAV capability, then RNAV routing can be applied.

Revise the Pilot/Controller Glossary as follows:

OLD	NEW
AREA NAVIGATION/RNAV - A method of navigation that permits aircraft operations on any desired course within the coverage of station-referenced navigation signals or	AREA NAVIGATION/RNAV - A method of navigation that permits aircraft operation on any desired course within the coverage of station-referenced navigation signals or

OLD	NEW
within the limits of self-contained system capability. (Refer to AIM, FAR Part 71)	within the limits of a self-contained system capability. The major types of equipment are:
1. Area Navigation Low Route - An area navigation route within the airspace extending upward from 1,000 feet above the surface of the earth to, but not including 18,000 feet MSL.	1. VORTAC referenced or Course Line Computer (CLC) systems, which account for the greatest number of RNAV units in use. To function, the CLC must be within the service range of a VORTAC.
2. Area Navigation High Route - An area navigation route within the airspace extending upward from and including 18,000 feet MSL to flight level 450.	2. OMEGA/VLF, although two separate systems, can be considered as one operationally. A long-range navigation system based upon Very Low Frequency radio signals transmitted from a total of 17 stations worldwide.
3. Random Area Navigation Routes/ Random RNAV Routes - Direct routes, based on area navigation capability, between waypoints defined in terms of latitude /longitude coordinates, degree/distance fixes, or offset from published or established routes/airways at a specified distance and direction.	3. Inertial (INS) systems, which are totally self-contained and require no information from external references. They provide aircraft position and navigation information in response to signals resulting from inertial effects on components within the system.
4. RNAV Waypoint/W/P - A predetermined geographical position used for route or instrument approach definition or progress reporting purposes that is defined relative to a VORTAC station position/or in terms of latitude/longitude coordinates.	Random Area Navigation routes are direct routes based on area navigation capability, between waypoints defined in terms of latitude/longitude coordinates. degree/distance fixes, or offsets from published or established routes/airways at a specified distance and direction.
ICAO - AREA NAVIGATION/RNAV - A method of navigation which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids or a combination of these.	ICAO - AREA NAVIGATION/RNAV No change.

OLD	NEW
WAYPOINT - (See Area Navigation)	WAYPOINT - A predetermined geographical position used for route/instrument approach definition, or progress reporting purposes, that is defined relative to a VORTAC station or in terms of latitude/longitude coordinates.

4. Operational Change.

Provides additional information on airborne RNAV equipment capabilities and pilot/controller responsibilities for RNAV routing. Eliminates little used information on area low/high routes which is contained in FAR 71/75. (Dean, ATO-330.7)

#

HANDBOOK: 7110.65D
CHANGE: 4
EFFECTIVE: January 16, 1986

1. Paragraph Number and Title

PILOT/CONTROLLER GLOSSARY

2. Background

Rationale for this change is provided in the background associated with the change to paragraph 5-13, Radar Service Termination.

3. Change

OLD

RADAR SERVICE TERMINATED-- Used by ATC to inform a pilot that he will no longer be provided any of the services that could be received while under radar contact. Radar service is automatically terminated, and the pilot is not advised in the following cases:

1. An aircraft cancels its IFR flight plan, except within a TCA, TRSA, or where Stage II service is provided.

2. At the completion of a radar approach.

3. When an arrivivg VFR aircraft receiving radar services is advised to contact the tower.

4. When an aircraft conducting a visual approach or contact approach is advised to contact the tower.

5. When an aircraft making an instrument approach has landed or the tower has the aircraft in sight, whichever occurs first.

NEW

RADAR SERVICE TERMINATION-- Used by ATC to inform a pilot that he will no longer be provided any of the services that could be received while in radar contact. Radar service is automatically terminated, and the pilot is not advised in the following cases:

1. An aircraft cancels its IFR flight plan, except within a TCA, TRSA, ARSA, or where Stage II service is provided.

2. An aircraft conducting an instrument, visual, or contact approach has landed or has been instructed to change to advisory frequency.

3. TERMINAL: An arriving VFR aircraft receiving radar service to a tower controlled airport within a TCA, TRSA, ARSA or where Stage II service is provided, has landed OR to all other airports, is instructed to change to tower or advisory frequency.

4. TERMINAL: An aircraft completes a radar approach.

4. Operational Change

This change ensures guidelines are commensurate with the intent of practical application of this procedure.

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memorandum

Subject: ACTION: Change to Handbook 7110.65,
Air Traffic Control

Date: MAR 15 1985

Walter H. Mitchell

From: Willard H. Reazin
for
Manager, Procedures Division, ATO-300

Reply to
Attn. of: Walden:426-8630

To: Manager, Airspace-Rules and Aeronautical
Information Division, ATO-200

Please make the following editorial change to Appendix C of Handbook 7110.65.

> Delete the words "if appropriate" from Appendix C, paragraph 4.f. (6) (a), (b) and (c), Point Out (Physical) Receiving Controller and from paragraph 4.g. (7) (a) and (b), Point Out (Interphone), Receiving Controller.

This is an editorial change to eliminate confusion and misunderstanding of the requirement to provide continuous target identity on radar point outs.

#

☆ U. S. GOVERNMENT PRINTING OFFICE : 1985 461-832/36740

Ai 7/3/984/guide

BRIEFING GUIDE

NEWARK PUBLIC LIBRARY

OCT 9 1984

U. S. GOVT. PUBS.
DEPOSITORY 376

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Distribution: A-WX(AT)-3; A-FAT-3,4,5,6,7(LTD);
A-FAT-1,2,8(MAX); AAT-210(40);
AAC-930(10); AGC-23(1)

Initiated By: AAT-300

TD 4.308:

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memorandum

Subject: ACTION: Change to FAAH-7110.65,
Paragraph 11c and 15b (1-7 and 1-9)

Reply to
Attn. of: Ponds:68532

Include the following changes in the next revision to FAAH-7110.65. The scheduled effective date is October 25, 1984.

1. Paragraph 11c(3), change U.S. Navy, CNO(OP-513) to read U.S. Navy, CNO (OP-554). (Paragraph 1-7)

2. Paragraph 15b, change U.S. Navy, CNO(OP-513) to read U.S. Navy: CNO(OP-554) and U.S. Air Force: AFXOOTF to read U.S. Air Force: AFXOORF. (Paragraph 1-9)

These changes are editorial and update U.S. Navy and U.S. Air Force addresses.

#

Handbook: 7110.65D
Change: Basic
Effective: Oct. 25, 1984

Handbook Change Briefing Sheet

1. Paragraph Number and Title

21, Abbreviations (1-24)
132, Forwarding Amended and UTM Data (2-40)

2. Background

NAS-MD-310 defines UTM as Unsuccessful Transmission Message. Paragraphs 21 and 132 of FAA Handbook 7110.65C defines UTM as Unsatisfactory Transmission Message. The following change is made to provide the correct definition.

3. Change

OLD		NEW
21. Abbreviations	(1-24)	21. Abbreviations
UTM Unsatisfactory transmission message		UTM - Unsuccessful transmission message
132. FORWARDING AMENDED AND UTM DATA	(2-40)	132. FORWARDING AMENDED AND UTM DATA
a. Forward any amending data concerning previously forwarded flight plans except that revisions to ETA information in 124.a.(3) need only be forwarded when the time differs by more than 3 minutes from the estimate given.		a. Same
Phraseology:		
(Identification), REVISED (revised information).		
132.a. Examples. -		
"American Two, revised flight level, three three zero."		
"United Eight Ten, revised estimate, Front Royal two zero zero five."		
"Douglas Five Zero One Romeo, revised altitude, eight thousand."		
"Eastern Four Thirty-six, revised type, heavy DC-8."		

b. Computer acceptance of an appropriate input message fulfills the requirement for sending amended data. The amendment data are considered acknowledged upon receipt of a CRD update message or a computer generated flight progress strip containing the amendment data.	b. Same
132.b. Note 1. - The successful utilization of automation equipment requires timely and accurate insertion of changes and/or new data.	
132.b. Note 2. - If a pilot is not issued a computer generated PDR/PDAR/PAR and amendment data are not entered into the computer, the next controller will have incorrect route information.	
c. Forward any amending control information and record the action on the appropriate flight progress strip.	c. Same
d. EN ROUTE: During Stage A operation, effect manual coordination on an initial interfacility flight plan message and on any subsequent messages related to that flight plan under the following conditions:	d. Same
(1) When a red coordination indicator is printed on the coordination strip.	(1) Same
(2) When a black coordination indicator is printed on the coordination strip and an Unsatisfactory Transmission Message (UTM) referencing that flight plan is received at the coordination sector. Draw a line through the computer coordination indicator and indicate when manual coordination has been effected.	(2) When a black coordination indicator is printed on the coordination strip and an Unsuccessful Transmission Message (UTM) referencing that flight plan is received at the coordination sector. Draw a line through the computer coordination indicator and indicate when manual coordination has been effected.

(3) When the transmission of the initial flight plan message is successful and a UTM is received containing revised data.	(3) Same

4. Operational Change

Editorial Change. (AAT-330.10 D. Schlosser)

HANDBOOK : 7110.65D
CHANGE : Basic
EFFECTIVE: 10/25/84

HANDBOOK CHANGE BRIEFING SHEET

1. PARAGRAPH NUMBER AND TITLE:

26. Radio Communications Transfer (2-17)

2. BACKGROUND: This change standardizes the phrase, REMAIN THIS FREQUENCY, for situations where the pilot expects a frequency change and the controller for various reasons does not want the pilot to change to another. frequency.

OLD

26. RADIO COMMUNICATIONS TRANSFER

a. Transfer radio communications before an aircraft enters the receiving controller's area of jurisdiction unless otherwise coordinated.

b. Transfer radio communications by specifying the following:

26. **Note.**—Radio communications transfer procedures may be specified by Letter of Agreement or contained in the route description of an MTR and as published in the DOD Planning AP/1B (AP/3).

(1) The facility name or location name and terminal function to be contacted. *TERMINAL:* Omit the location name when transferring communications to another controller within your facility except as required in 1162.

(2) Frequency to use, except the following may be omitted:

(a) FSS frequency.

(b) Departure frequency if previously given or published on a SID chart for the procedure issued.

(c) *TERMINAL:*

(i) Ground or local control frequency if in your opinion the pilot knows which frequency is in use.

(ii) The numbers preceding the decimal point if the ground control frequency is in the 121 MHz bandwidth.

26.b. **Examples.**—
"Contact tower."
"Contact ground."
"Contact ground point seven."
"Contact ground, one two zero point eight."
"Contact Huntington Radio."
"Contact departure."
"Contact Los Angeles Center, one two three point four."

NEW

a., b., and c. (No change)

OLD	NEW
(3) Time, fix, altitude, or specifically when to contact a facility. You may omit this when compliance is expected upon receipt. 28.b.(3) Note.—The AIM, paragraph 340, informs pilots that they are expected to maintain a listening watch on the transferring controller's frequency until the time, fix, or altitude specified.	
d. (None).	d. In situations where the controller does not want the pilot to change frequency but the pilot is expecting or may want a frequency change, use the following phraseology; PHRASEOLOGY: REMAIN THIS FREQUENCY.

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memorandum

Subject: **Action:** Change to FAAH 7110.65, Paragraph 974 (3-84)

Reply to
Attn. of: **Ponds:426-8532**

Include the following changes in the next revision to FAAH 7110.65:

PARAGRAPH NUMBER AND TITLE:

974. ILS Protection/Critical Areas (3-84)

BACKGROUND:

All changes are Air Force related and have no effect on FAA procedures. The Air Force is deleting exceptions to FAA procedures applicable to Air Force only operations.

CHANGE:

974. NOTE 2

OLD	NEW
NOTE 2: At USAF bases, the critical areas and the touchdown area will be protected by an "instrument hold line." An instrument hold line is marked only when a restriction short of the runway is necessary.	NOTE 2: At USAF bases, the critical areas and the obstacle critical area (touchdown area) will be protected by an instrument hold line. "An instrument hold line is marked only when a restriction short of the runway is necessary. See AFR 60-5 for the dimensions of the critical areas and obstacle critical areas (touchdown area)."

974b. Obstacle Critical Area

(1) USAF NOT APPLICABLE. A rectangular obstacle critical area surrounds the approach end of each CAT II and CAT III ILS	A rectangular obstacle critical area surrounds the approach end of each Category II an Category III ILS runway. When conditions are

OLD	NEW
runway. When conditions are reported ceiling less than 200 feet and/or RVR 2,000 or less, do not authorize vehicles/aircraft to be in the area when an aircraft conducting an approach/missed approach enters/is over the area.	reported ceiling less than 200 feet and/or RVR 2,000 or less (USAF: ½ mile if no RVR), do not authorize vehicles/aircraft to be in the area when an aircraft conducting an approach/missed approach enters/is over the area.
	974b NOTE - USAF: A rectangular obstacle critical area surrounds the approach end of each Category II/III ILS or PAR (with HAT below 200') runway.
974b(2)	DELETE
974d(1)	DELETE "USAF NOT APPLICABLE."
974d(2)	
(2) *USAF NOT APPLICABLE.* In addition to (1) above, when conditions are reported ceiling less than 200 feet and/or RVR 2,000 or less, do not authorize vehicle or aircraft operations in or over the area when an arriving aircraft is inside the ILS MM.	(2) In addition to (1) above, when conditions are reported ceiling less than 200 feet and/or RVR 2,000 or less (USAF: ½ mile if no RVR), do not authorize vehicle or aircraft operations in or over the area when an arriving aircraft is inside the ILS MM (USAF: 1 NM from TD if no MM).
974d(3)	DELETE
	974e Add at the end of the paragraph: (USAF: 1 NM from TD if no MM).
974e NOTE	DELETE

#

U.S. Department
of Transportation

**Federal Aviation
Administration**

Memorandum

Subject: **ACTION:** Change to FAA Handbook 7110.65C, Paragraph 1021 (3-145)

Reply to
Attn. of: Ponds:426-8532

Include the following in the next revision to 7110.65C:

Delete the phrase "REMAIN THIS FREQUENCY" from paragraph 1021, (3-145) Helicopter Landing Clearance, phraseology section, line 15.

We are adding "REMAIN THIS FREQUENCY" to paragraph 26 which will cover all situations where the controller does not want a pilot to change to another frequency too soon; therefore, the phrase is no longer required in this paragraph.

#

HANDBOOK : 7110.65
CHANGE : Basic D
EFFECTIVE: 10/25/84

HANDBOOK CHANGE BRIEFING SHEET

1. **PARAGRAPH NUMBER AND TITLE:**

652. Service Termination (5-13)

2. **BACKGROUND:**

Change 4 to FAAH 7110.65B was effective January 1, 1981. The change affected paragraphs 652, 1240, 1250, 1280 and the pilot controller glossary.

The intent of the change to paragraph 652 was to eliminate some of the terms applied to the National Terminal Radar Program, to reduce confusion concerning the services available, and to simplify the program.

When the change was made, "VFR" was left out of paragraph 652b4 because 652b1, 2, and 3 cover operations other than VFR. However, we are convinced that "VFR" should be added to paragraph 652b4 for clarity and to make it consistent with the glossary.

3. **CHANGE:**

OLD	NEW
652. SERVICE TERMINATION	652. SERVICE TERMINATION (5-13)
a. Inform aircraft when radar service is terminated. *Phraseology:* RADAR SERVICE TERMINATED (nonradar routing, if required).	a. No change.
b. Radar service is automatically terminated and the aircraft need not be advised of termination in the following cases:	b. No change.
652.b. Note.—Termination of radar monitoring when conducting simultaneous ILS approaches is prescribed in [illegible]. Termination of radar monitoring where PAR equipment is used to monitor approaches is prescribed in [illegible].	652.b. Note - No change.
(1) An aircraft cancels its IFR flight plan, except within a TCA, TRSA, or where Stage II service is provided.	(1) No change.
(2) An aircraft making an instrument approach has landed or the tower sights the aircraft whichever occurs first.	(2) No change.
(3) An aircraft conducts a visual approach or contact approach and is advised to contact the tower.	(3) No change.
(4) *TERMINAL:* An arriving aircraft, receiving radar services, is advised to contact the tower.	(4) TERMINAL: An arriving VFR aircraft, receiving radar services, is advised to contact the tower.
(5) *TERMINAL:* At the completion of a radar approach.	(5) No change.

4. **EDITORIAL CHANGE:**

This change will clarify paragraph 652b4 and make it consistent with the pilot controller glossary.

HANDBOOK : 7110.65
CHANGE : Basic D
EFFECTIVE: October 25, 1984

HANDBOOK CHANGE BRIEFING SHEET

1. PARAGRAPH NUMBER AND TITLE:

1282 - Separation (7-92)

2. BACKGROUND:

The Terminal Radar Program was instituted to extend terminal radar services to VFR aircraft. The Stage III portion of this program provides, in addition to the basic radar services and Stage II, separation between all participating VFR aircraft. The purpose in establishing this program was to enhance safety of flight at busy "Large Hub" locations. It was in no way intended to eliminate or inhibit VFR flight. However, it has had an indirect effect since application of the 1 1/2 mile separation standard close in to the airport reduces the number of aircraft movements in that airspace.

In 1980, a task force chaired by the Terminal Procedures Branch, AAT-320, examined the extent and means of Stage III separation services applied in terminal radar service areas (TRSA's) at several locations. The analysis by the task force indicated that many of the controllers believed strongly that applying Stage III separation to local pattern traffic was unduly restrictive. The rationale offered was that basic VFR tower airport traffic control techniques of timely sequencing and traffic advisories are more appropriate to this type of traffic than Stage III separation. In addition, it was a consensus of pilots contacted that required separation during transition to and within the traffic pattern should be reduced from the 1 1/2 miles or 500 feet criteria.

In April 1981, the Eastern Region requested that a revision be made to Handbook 7110.65 authorizing helicopters to operate within a TCA/ Stage III area using SVFR criteria contained in paragraphs 1140 and 1141. They further requested that they be authorized to conduct an evaluation of this recommendation at certain specified airports. That authority was granted on June 3, 1981, but was used only sparingly due to the strike and the requirement for a Letter of Agreement with the operators. This authorization allowed separation between helicopters and arriving/departing fixed-wing aircraft by 1/2 mile under certain conditions. These conditions occur close in to the runway where congestion is greatest and the 1 1/2 mile Stage III separation standard inhibits orderly and efficient traffic management.

In July 1982, the authority was extended in order to evaluate the reduced helicopter separation standard without the requirement for a Letter of Agreement.

In February 1984, the the Eastern Region reported that use of this authority has significantly expanded and is benefiting not only the helicopters but also the fixed-wing aircraft and the ATC system. The report cites numerous benefits such as: increased efficiency in the ATC system; more efficient use of airspace, airports and heliports; greater flexibility in the use of landing/takeoff areas; increased safety and fuel economy to users.

In February 1983, National Airspace Review Task Group 2-4.1 also recommended a change to Stage III separation for helicopters. This group recommended that "FAA Handbook 7110.65C, Paragraph 1282, be amended to provide a 1/2 mile separation between Stage III helicopters and arriving/departing IFR aircraft within 1 mile of the runway." This recommendation is very close to the authority given to Eastern Region in 1981.

Eastern Region's use of a reduced separation in Stage III operations between helicopters and arriving/departing fixed-wing aircraft has increased efficiency without a compromise in safety. In the interest of improving air traffic management efficiency, it is practical to allow general use of this reduced separation standard. This change will permit the controller greater flexibility close in, where the 1 1/2 mile requirement of Stage III is causing the most difficulty.

3. CHANGE:

OLD	NEW
1282. SEPARATION	1282. No Change. (7-92)
As appropriate, separate aircraft in accordance with Chapters 3, 4, 5, and 6 minima. Any of the following may be applied within a TRSA/TCA:	
1282. Note 1.--Assignment of radar headings, routes, or altitudes is based on the provision that a pilot operating in accordance with VFR is expected to advise ATC if compliance will cause him to violate any FARs.	

1282. Note 2.--Stage III separation and sequencing for VFR aircraft is dependent upon radar. When a radar outage occurs, efforts should be made to segregate VFR traffic from the IFR traffic flow.	
a. Visual separation, as specified in 490, 796, and 1262.	1282.a. No change.
1282.a. Note.--The provisions of 796.d.(2) and (3) are applicable to Stage III operations.	
1282.a. Reference.--Glossary (Visual Separation).	
b. 500 feet vertical separation between VFR aircraft and between a VFR and an IFR aircraft.	1282.b. No change.
1282.b. Note.--500 feet vertical separation shall not be applied below a heavy jet.	
1282.b. Reference.--Minima, 1420.	
c. Within 15 miles of the radar antenna, separate helicopters and Category I and II VFR aircraft from:	1282.c. No change.
1282.c. Note.--This procedure DOES NOT apply between IFR aircraft.	
1282.c. Reference.--Aircraft Categories, 1110.a. Note.	
(1) Other Category I or II VFR/IFR aircraft by a minimum of 1 1/2 miles.	
(2) Category III VFR/IFR aircraft by 1 1/2 miles only when both aircraft are on parallel courses.	
	1282.d. Within 1 mile of the runway end, 1/2 mile lateral separation between a helicopter and a fixed-wing aircraft/IFR helicopter on a straight in approach or a straight out departure.
	1282.d. Reference - Lateral Separation, Pilot/Controller Glossary.
	1282.d.Note. This procedure applies when either of the two aircraft being separated is within 1 mile of the runway end.

4. OPERATIONAL CHANGE:

This change will permit more efficient use of the airspace without compromising safety. It will enable a controller to move helicopter traffic into and out of landing and takeoff helipads while greatly reducing the time delays to all traffic.

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memorandum

Subject: ACTION: Change to Handbook 7110.65C -
Paragraph 224 (8-41)

Reply to
Attn. of: Pack:426-8630

To: Manager, Airspace-Rules and Aeronautical Information Division, AAT-200

Please make the following editorial change to Handbook 7110.65C:

> Paragraph 224.a, change the phrase (FL 290 and above - 1,000 feet) to read (above FL 290 - 1,000 feet).

This change is editorial to make the wording in paragraph 224 consistent with paragraph 222. (8-41 consistent with 6-51)

If you have any questions or need additional information, please contact Bill Pack, 426-8630.

#

Handbook: 7110.65D
Change: Basic
Effective Date: 10/25/84

Handbook Change Briefing Sheet

1. Paragraph Numbers and Titles

1593, Emergency Locator Transmitter (ELT) Signals (9-26)

2. Background

A lack of standardized reporting format has been cited as a problem in the communications and coordination process between the ARTCC's and AFRCC. In order to expedite the data flow necessary for the accomplishment of the ELT investigations, a standardized FAA ELT incident report form has been developed for use by the ARTCC's.

3. Change

OLD	NEW
When an ELT signal is heard or reported:	When an ELT signal is heard or reported:
a. EN ROUTE: Notify the Rescue Coordination Center (RCC).	a. EN ROUTE: Notify the Rescue Coordination Center (RCC).
	1593.a. Note. - FAA Form 7210.8, ELT Incident, contains standardized format for coordination with the RCC. (See Order 7210.3 - 1140.)

4. Operational Change

Adds explanatory note. (AAT-330.10, Schlosser)

HANDBOOK : 7110.65C
CHANGE :
EFFECTIVE: October 25, 1984

HANDBOOK CHANGE BRIEFING SHEET

1. PARAGRAPH NUMBER AND TITLE:

1700. Application (10-1)
1701. Definitions (10-2)
1702. Block Airspace (10-3)
1705. Reserved
1706. Reserved
1707. Reserved
1710. Longitudinal Separation (10-10)
1711. Lateral Separation (10-12)
1712. Initial Separation of Departures and Arrivals (10-13)
1713. Visual Separation and VFR (10-14)
1714. Special VFR (10-15)
1715. Approaches (10-16)
1716. Lengthy Delay (10-17)
1717. Altitude for Direction of Flight (10-18)
1718. Reserved
1732. Passing-Opposite Courses (10-32)
1733. Special Use Airspace (10-33)
1735. Radar Monitoring/RNAV
1736. Radar Arrivals (10-35)

2. BACKGROUND:

Through the efforts of the National Airspace Review (NAR), Task Group 1-5.3, which addressed common U.S./Canadian airspace and procedures integration, Chapter 9, Canadian Airspace Procedures, was modified. First, changes necessary to accommodate the Canadian Airspace Reorganization, effective May 10, 1984, were identified and formulated. Secondly, changes required to incorporate all Canadian procedures that are more stringent than those used in the United States were considered and appropriately prepared for inclusion in chapter 9. Finally, the remaining portion of the chapter was evaluated for accuracy and, accordingly, revised.

3. CHANGE:

OLD	NEW
1700. Application.	1700. No change. (10-1)
# # # # #	# # # # #

OLD	NEW
(1) Above FL 230-271a.	(1) No change.
1700b(1). Reference - Minima on Same, Converging or Crossing Courses, 271.	
(2) At any time:	(2) At any time:
(a) 271e.	(a) No change.
(b) Section 15 of Chapter 3.	(b) No change.
(c) 490.	(c) No change.
(d) 741/1732 in Stage A.	(d) 741.
(e) 773.	(e) No change.
(f) 795.	(f) No change.
1700b(2). Reference - Minima on Same, Converging, or Crossing Courses, 271; Timed Approaches, Chapter 3, Section 15; Visual Separation, 490; Passing or Diverging, 741; Vectors Below Minimum Altitude, 733; Approach Separation Responsibility, 795; Passing Opposite Courses, 1782.	1700b(2). Reference - Minima on Same, Converging, or Crossing Courses, 271; Timed Approaches, Chapter 3, Section 15; Visual Separation, 490; Passing or Diverging, 741; Vectors Below Minimum Altitude, 773; Approach Separation Responsibility, 795.
(3) TERMINAL: The cleared for the option procedures.	(3) No change.
1700b(3). Reference - Sequence/Spacing Application, 1100.	
1701. DEFINITIONS.	1701. DEFINITIONS. (10-2)
ALERT AREA - An airspace of defined dimensions within which a high volume of pilot training or an unusual type of aerial activity may be carried out, which is designated as an alert area in the Canadian Designated Airspace Handbook.	CLASS A AIRSPACE Controlled airspace within which only IFR flights are permitted.
BLOCK AIRSPACE - The airspace within low level airways extending upward from 9,500 feet MSL east of longitude 114° west and from 12,500	CLASS B AIRSPACE Controlled airspace within which only IFR and Controlled VFR flights are permitted.
	CLASS C AIRSPACE Controlled airspace within which both IFR and VFR flights are permitted but VFR flights require a clearance from ATC to enter.

OLD

feet MSL west of longitude 114° west.

CANADIAN DOMESTIC AIRSPACE - All navigable airspace of Canada designated and defined as such in the Canadian Designated Airspace Handbook.

CONTROLLED VFR FLIGHT - A flight conducted under the visual flight rules within the Block Airspace and in accordance with an air traffic control clearance.

DANGER AREA - An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times.

HIGH LEVEL AIRSPACE - All airspace within the Canadian Domestic Airspace 18,000 feet MSL and above.

LOW LEVEL AIRSPACE - All airspace within the Canadian Domestic Airspace below 18,000 feet MSL.

MILITARY FLYING AREA - An airspace of defined dimensions within High Level Airspace designated for the use of Military Training and Testing.

NEW

CLASS D AIRSPACE
Controlled airspace within which both IFR and VFR flights are permitted but VFR flights do not require a clearance from ATC to enter.

CLASS E AIRSPACE
Airspace within which IFR and VFR flights are not subject to control.

CLASS F AIRSPACE
Airspace of defined dimensions within which activities must be confined because of their nature, or within which limitations are imposed upon aircraft operations that are not a part of those activities, or both.

ALERT AREA: An airspace of defined dimensions within which a high volume of pilot training or an unusual type of aerial activity may be carried out. (Publication designation - CYA)

DANGER AREA: An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times. (Publication designation - CYO)

MILITARY FLYING AREA: An airspace of defined dimensions within High Level Airspace designated for the use of Military Training and Testing.

CONTROLLED VFR FLIGHT - A flight conducted under the visual flight rules within Class B Airspace and in accordance with an air traffic control clearance.

HIGH LEVEL AIRSPACE - All airspace within the Canadian Domestic Airspace 18,000 feet MSL and above.

OLD	NEW
	LOW LEVEL AIRSPACE - All airspace within the Canadian Domestic Airspace below 18,000 feet MSL.
1702. BLOCK AIRSPACE	1702. CLASS B AIRSPACE. (10-3)
Provide IFR control service to all controlled visual flight rules (CVFR) aircraft operated in Block Airspace.	The ATC procedures pertinent to IFR flight shall be applied to controlled visual flight rules (CVFR) aircraft. Do not apply visual separation or VFR-on-top clearance, or 1000-on-top clearance.
1702. Note 1. - The pilot is responsible to maintain VFR flight at all times.	1702. Note 1. - The CVFR pilot is responsible to maintain VFR flight and visual reference to the ground at all times.
1702. Note 2. - ATC clearance for CVFR flight will not normally be issued prior to takeoff, but rather upon receipt of a position report filed by the pilot upon reaching the last 1,000 foot altitude below the base of the Block Airspace (8,500 or 11,500) with a request for a clearance.	1702. Note 2. - ATC clearance for CVFR flight will not normally be issued prior to takeoff, but rather upon receipt of a position report and a request for clearance by pilot upon reaching the last 1,000 foot altitude below the base of Class B Airspace (11,500 MSL).
PHRASEOLOGY:	
MAINTAIN (altitude) VFR.	
1705. None.	1705. DEPARTURE CLEARANCE/ COMMUNICATION FAILURE (10-6)
	a. Base controller action regarding radio failures in Canadian Airspace on the fact that pilots are required to comply with Canadian Airspace Regulations.
	b. Canadian communication failure regulations are similar to FAR 91.127; however, the following major difference shall be considered when planning control actions:

OLD	NEW
	Except when issued alternate radio failure instructions by an ATC Unit, pilots will adhere to the following: If flying a turbine-powered (turboprop or turbojet) aircraft and cleared on departure to a point other than destination, proceed to the destination airport in accordance with the flight plan, maintaining the last assigned altitude or flight level or the minimum enroute IFR altitude whichever is higher, until 10 minutes beyond the point specified in the clearance (clearance limit) and then proceed at altitude(s) or flight level(s) filed in the flight plan. When the aircraft will enter United States airspace within 10 minutes after passing the clearance limit, the climb to the flight planned border crossing altitude is to be commenced at the estimated time of crossing the Canadian/United States boundary. c. When issuing clearances to departures from Canadian airports and paragraph 350h(3) applies, specify the radio failure altitude in lieu of issuing the "Expect (altitude)." PHRASEOLOGY: IN THE EVENT OF RADIO FAILURE, MAINTAIN (the filed altitude or an altitude within the filed stratum as near as possible to the filed altitude).
1706. None.	1706. PARACHUTE JUMPING. (10-7) Do not authorize parachute jumping without prior permission from the appropriate Canadian authority. 1706. NOTE. - Canadian Regulations require written authority from the Ministry of Transport.

OLD	NEW
1707. None.	1707. TRANSPONDER/MODE C DEVIATIONS (IFR FLIGHT). (10-8) Preflight Transponder/Mode C deviations can be approved in Canadian airspace only upon receipt of written notification. 1707. NOTE. - Remarks in flight plan may serve as written notification.
1710. LONGITUDINAL SEPARATION.	1710. LONGITUDINAL SEPARATION. (10-10)
a. Separate aircraft at any altitude using DME by a minimum of 30 miles except that 10 miles may be used when the leading aircraft maintains a speed at least 40 knots faster than the succeeding aircraft.	a. No change.
1710a. Reference. - Minima on Same, Converging, or Crossing Courses, 271.	
b. Separate aircraft above FL 230 by 5 minutes when the leading aircraft maintains a speed at least 40 knots faster than the following aircraft and one of the conditions listed in 271b(1), (2), or (3) exists.	b. No change.
1710b. Reference. - Minima on Same, Converging, or Crossing Courses, 271.	
c. Provide vertical separation to opposite direction aircraft at FL 230 and below until both aircraft have reported passing the same radial or LFR course, provided the radial or course is crossed at an angle of a least 45 degrees and the aircraft:	c. Delete and include information in new paragraph 1711a.
(1) Are at least 2 minutes apart when within 25 miles of the NAVAID producing the radial or LFR course.	

OLD	NEW
(2) Are at least 4 minutes apart when beyond 25 miles of the NAVAID producing the radial or LFR course.	
1710c(2). Reference. - Minima on Opposite Courses, 272.	
d. Provide vertical separation to opposite direction aircraft above FL 280 until both aircraft have reported the same NAVAID, radial, or LFR course, provided the radial or course is crossed at an angle of at least 45 degrees and the aircraft are at least 2 minutes apart.	d. Delete and include information in new paragraph 1711b.
1710d. Reference. - Minima on Opposite Courses, 272.	
e. When reports indicate that opposite direction aircraft using DME have passed, you may clear an aircraft to climb or descend when position reports indicate 5 mile separation exists provided the outbound aircraft is 15 miles or more from the DME NAVAID.	e. Delete and include information in new paragraph 1711c.
1710e. Reference. - Minima on Opposite Courses, 272.	
1711. LATERAL SEPARATION.	1711. VERTICAL SEPARATION. (10-11)
The information contained in old paragraph 1711, Lateral Separation, has been relocated in new paragraph 1712.	a. Provide vertical separation to opposite direction aircraft at FL 230 and below until both aircraft have reported passing the same NAVAID or visual fix; or both aircraft have reported passing the same OMNI radial at an angle of at least 45 degrees or more and are:
	(1) Are at least 2 minutes apart when within 25 miles of the NAVAID producing the radial.
	(2) Are at least 4 minutes apart when beyond 25 miles of the NAVAID producing the radial.

OLD

NEW

1711a(2). Reference. - Minima on Opposite Courses, 272.

b. Provide vertical separation to opposite direction aircraft above FL 230 until both aircraft have reported the same NAVAID or radial provided the radial or course is crossed at an angle of at least 45 degrees and the aircraft are at least 2 minutes apart.

1711b. Reference. - Minima on Opposite Courses, 272.

c. When reports indicate that opposite direction aircraft using DME have passed, you may clear an aircraft to climb or descend when position reports indicate 5-mile separation exists provided the outbound aircraft is 15 miles or more from the DME NAVAID.

1711c. Reference. - Minima on Opposite Courses, 272.

d. Unless lateral separation exists, apply vertical separation between an en route aircraft and a holding aircraft or an aircraft on an instrument approach procedure, before and after the outer-edge of the appropriate protected airspace for the following time period:

(1) FL 230 and below:

(a) 15 minutes.

(b) 10 minutes if NAVAIDs permit frequent determination of position and speed.

(2) Above FL 230:

(a) 20 minutes.

(b) 15 minutes if NAVAIDs are 60 minutes or less flying time apart.

OLD	NEW
	(c) 10 minutes if NAVAIDS are 40 minutes or less flying time apart. e. You may discontinue vertical separation between an en route aircraft and a holding aircraft or an aircraft on an instrument approach procedure provided the en route aircraft: (1) Has reported over a fix within the appropriate protected airspace; and (2) Is 5 minutes from the outer-edge of the holding or approach area.
1711. LATERAL SEPARATION.	1712. LATERAL SEPARATION. (10-12)
Protect airspace along high level airways, routes, direct courses, and course change 15 degrees or less:	Protect airspace along airways, routes, direct courses, and course changes 15 degrees or less as follows:
1711. Reference. - Separation Methods, 280; Minima Along Other Than Established Airways or Routes, 281.	
a. On high level airways formed by VOR radials and direct courses between VORs at any altitude; high level airways and routes and direct courses at FL 230 and below formed by non-directional radio beacons, low frequency range courses or a combination of one of these and a VOR radial - 4.5 miles on each side of the route to a point 39.5 miles from the NAVAID then increasing in width on a 6 1/2 degree angle on each side of the route to points where the lines defining the angular divergence intercept similar lines from the adjacent NAVAID.	a. In LOW LEVEL Controlled Airspace below 18,000 MSL protect: (1) for tracks along: (a) low level airways, and (b) OFF-AIRWAY tracks within signal coverage of ground based navigation aids, a width of 4.5 miles each side of track outward from the NAVAID to a distance of 39.5 miles - beyond this distance protect within lines extending from the NAVAID and diverging at 6 1/2 degrees each side of track until

OLD	NEW
	interception of similar lines from an adjacent NAVAID. (2) For OFF-AIRWAY tracks BEYOND signal coverage range of ground based navigational aids a width of 45 miles each side of track. This separation applies to random RNAV routes for areas outside of radar coverage.
b. On high level airways and routes and direct courses above FL 230 formed by nondirectional radio beacons; low frequency range courses or a combination of one of these and a VOR radial - 4.5 miles one each side of the route to a point 30.2 miles from the NAVAID, then increasing in width of a 8 1/2 degree angle on each side of the route to points where the lines defining the angular divergence intercept similar lines from the adjacent NAVAID.	b. In HIGH LEVEL Controlled Airspace above 18,000 MSL protect: (1) For tracks along airways formed by VOR radials a width of 4.5 miles each side track outward from the NAVAID to a distance of 39.5 miles - beyond this distance protect within lines extending from the NAVAID and diverging 8 1/2 degrees each side of track until interception or similar lines from the adjacent ontrack NAVAID; (2) For tracks along airways formed by: (a) ADF Bearings. (b) A combination of VOR RADIALS and ADF as in (1) except to a distance of 30.2 miles then diverging at 8 1/2 degrees. (3) For OFF-AIRWAY tracks within signal coverage of ground based NAVAIDs as required by (1) or (2) as appropriate; (4) For OFF-AIRWAY tracks BEYOND signal coverage of ground based NAVAIDs a width of 45 miles each side of track. This separation applies to random RNAV routes

OLD	NEW
c. Where a course change at FL 180 and above is 16 degrees through 90 degrees, protect additional airspace on the overflown side beginning at the point where the course changes until the aircraft is reestablished on course, as follows:	c. Same as 1711c.
(1) An amount determined by the use of the appropriate Canadian turning template and covered in a Letter of Agreement with the appropriate Canadian air traffic control unit, or	(1) Same as 1711c(1).
1711c(1). Note. - Templates have been supplied to Canadian ATC units for use in determining airspace to be protected for aircraft turning. Where possible, advance coordination should be accomplished with the appropriate Canadian unit to obtain a determination by template as to the amount of additional airspace to be protected for turning aircraft.	1712c(1). Note. - Same as 1711c(1) Note.
(2) FL 180 to FL 450 inclusive - 16 miles.	(2) Same as 1711c(2).
(3) Above FL 450 - 18 miles.	(3) Same as 1711c(3).
d. When the course change at FL 180 and above is 91 degrees, in addition to additional airspace beyond the turning point specified in c(2) and c(3), protect additional airspace on the overflown side until the aircraft is reestablished on course, as follows:	d. Same as 1711d.
(1) FL 180 to FL 450 inclusive - 27 miles.	(1) Same as 1711d(1).
(2) Above FL 450 - 34 miles.	(2) Same as 1711d(2).

OLD	NEW
1712. INITIAL SEPARATION OF DEPARTURES AND ARRIVALS	Change paragraph number to 1713.(10-13)
a. When aircraft will fly the same course initially but will fly diverging courses within 5 minutes after takeoff, provide 3 minutes separation until courses diverge. 1712a. Reference - Minima on Diverging Courses, 340.	
b. When aircraft using DME will fly the same course inititally, but will fly diverging courses within 15 miles after takeoff, provide 5 miles separation until courses diverge. 1712b. Reference - Minima on Diverging Courses, 340.	
c. Separate aircraft that will fly the same course when the following aircraft will climb through the altitude assigned to the leading aircraft by using a minimum of 5 minutes until the following aircraft passes through the altitude of the leading aircraft or 10 miles if both aircraft are using DME. 1712c. Reference - Minima on Same Course, 341.	
d. Separate a departing aircraft from arriving aircraft making an instrument approach to the same airport by permitting a takeoff which differs by at least 45 degrees from the reciprocal of the final approach course until one of the following conditions exists: 1712d. Reference - Separation Minima, 345.	
(1) The arriving aircraft reports commencing procedure turn if making a complete instrument approach, or	
(2) The arriving aircraft is estimated to be 3 minutes from the airport if making a straight-in approach.	

OLD	NEW
1713. VISUAL SEPARATION AND VFR	1714. VISUAL SEPARATION AND VFR (10-14)
An aircraft may be cleared to maintain "1,000 feet on top" (in lieu of VFR-on-top) or may be issued VFR separation when requested by the pilot except: 1713. Reference - VFR-on-Top, 492.	a. Clear an aircraft to maintain "1,000-feet-on-top" in lieu of VFR-on-top. b. An aircraft may be cleared to maintain "1,000 feet on top" (in lieu of VFR-on-top) or may be issued VFR separation when requested by the pilot except: 1714. Reference - VFR-on-top, 492.
a. In Block Airspace.	(1) In Class A or B airspace.
b. In controlled high level airspace at or below FL 450.	
c. Within airspace reservations, unless it is a military aircraft operating "at least 1,000 feet on top" or VFR. Such military aircraft may be cleared into or through a military reservation.	(2) Within airspace reservations, unless it is a military aircraft operating "at least 1,000 feet on top" or VFR. Such military aircraft may be cleared into or through a military reservation.
1714. SPECIAL VFR	1715. SPECIAL VFR (10-15)
Authorize Special VFR operations to or from Canadian airports, within control zones, with the following Canadian Special VFR weather minima: 1714. Reference - Authorization, 470; Special VFR, Chapter 3, Section 16.	No change.
a. Aircraft other than helicopters:	a. No change.
(1) Ceiling 500 feet and visibility three miles.	
(2) Ceiling 600 feet and visibility two miles.	
(3) Ceiling 700 feet and visibility one mile.	
b. Helicopters:	b. Helicopters: Ceiling 300 feet and visibility one mile.
(1) Ceiling 300 feet and visibility three miles.	

OLD	NEW
(2) Ceiling 400 feet and visibility two miles. (3) Ceiling 500 feet and visibility one mile.	1715. NOTE - In Canadian airspace, pilots do not have to be instrument rated to fly SVFR at night nor do aircraft have to be equipped for IFR flight.
1715. APPROACHES	1716. APPROACHES (10-16)
a. Clear aircraft for a "company" instrument approach only if the aircraft is identified on the procedure as one being approved or the pilot otherwise states that approval has been granted for use of the procedure.	a. No change.
1715a. NOTE - A Canadian "company" instrument approach procedure is similar to a U.S. "special" instrument approach procedure; i.e., one that is approved for use by specific aircraft or aircraft operators.	
1715a. Reference - Clearance, 420.	
b. Clear an aircraft for a contact approach only when the pilot has requested it and the reported ground visibility is at least 1 statute mile. Apply standard separation between such aircraft and other IFR or Special VFR aircraft.	b. Clear an aircraft for a visual approach in lieu of contact approach only when the pilot has requested it and the reported ground visibility is at least 1 statute mile. Apply standard separation between such aircraft and other IFR or Special VFR aircraft.
1715b. NOTE - In Canada, this approach is named "visual approach." Should a Canadian pilot request a visual approach, use the contact approach procedures.	1716b. NOTE - In Canada, this approach is named "visual approach." Should a Canadian pilot request a visual approach, use the contact approach procedures.
1715b. Reference - Contact Approach, 432. Applicable Canadian Air Regulations.	1716b. Reference - Contact Approach, 432. Applicable Canadian Air Regulations.

OLD

1716. LENGTHY DELAY

If an aircraft intending to land within your area would be delayed 30 minutes or more, issue EAC or EFC as soon as practicable after it enters your area and notify the aircraft operator concerned.

1717. ALTITUDE FOR DIRECTION OF FLIGHT

Inform an aircraft of the correct altitude for direction of flight when a report from an aircraft maintaining 1,000 on top indicates it is not complying with Canadian Air Regulations.

Phraseology:
1,000 ON TOP CRUISING LEVELS FOR YOUR DIRECTION OF FLIGHT ARE:

From 3,500 feet above the surface up to but not including FL 290.

ODD/EVEN ALTITUDES/FLIGHT LEVELS.

At or above FL 290
FOUR THOUSAND FOOT FLIGHT LEVELS BEGINNING AT FLIGHT LEVEL TWO NINE ZERO/THREE ONE ZERO.

1717. NOTE - As required by Canadian Air Regulations (ANO V, No. 2), the appropriate VFR (1,000 on top) altitudes are as follows:

NEW

1717. LENGTHY DELAY (10-17)

If an aircraft is expected to be delayed 30 minutes or more at the destination airport:

a. Issue, either directly or

approach-clearance, and

b. Inform the aircraft operator if practicable.

1717. NOTE - Expect-approach-clearance time is defined as the time at which it is expected that an aircraft will be cleared to commence aproach for a landing.

1718. ALTITUDE FOR DIRECTION OF FLIGHT (10-18)

Inform an aircraft of the correct altitude for direction of flight when a report from an aircraft maintaining 1,000 on top indicates it is not complying with Canadian Air Regulations.

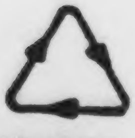
Phraseology:
1,000 ON TOP CRUISING LEVELS FOR YOUR DIRECTION OF FLIGHT ARE:

From 3,500 feet above the surface up to but not including 12,500 MSL ODD/EVEN ALTITUDES.

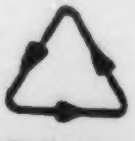
OLD	NEW
Flight on magnetic courses 000-179 FL 290 and above: 4,000 foot intervals beginning with FL 290. Examples: FL 290, FL 330.	
3,500 feet above surface but not including FL 290: "Odd" cardinal altitudes. Examples: 5,000, 7,000, FL 250, FL 270.	
Flights on magnetic courses 180-359 FL 290 and above: 4,000 foot intervals beginning with FL 310. Examples: FL 310, FL 350.	
3,500 feet above the surface to but not including FL 290: "Even" cardinal altitudes. Examples: 4,000, 6,000, FL 260, FL 280.	
1717. Reference - Altitude for Direction of Flight, 493.	
1718. RESERVED	
1732. PASSING-OPPOSITE COURSES	1732. PASSING-OPPOSITE COURSES (10-32)
Vertical separation between aircraft on opposite courses only may be discontinued when the following conditions are met:	Except when using a full digital system, vertical separation between aircraft on opposite coures only may be discontinued when the following conditions are met:
1732. Reference - Passing or Diverging, 741.	
a. You observe that they have passed each other.	a. No change.
b. Their tracks are monitored to assure that their primary targets or beacon control slashes will not touch.	b. No change.

READEX FICHE

OLD	NEW
1733. SPECIAL USE AIRSPACE	1733. CLASS F (SPECIAL USE) AIRSPACE (10-33)
Separate aircraft from the boundary of restricted airspace, military flying areas, active danger, and active alert areas by the following minima:	No change.
1733. Reference - Adjacent Airspace, 750.	
a. If less than 40 miles from the antenna site and ASR equipment is used - 3 miles.	a. No change.
b. Otherwise - 5 miles.	b. No change.
1735. RADAR MONITORING/RNAV	DELETE
Provide radar monitoring of all RNAV operations in Canadian airspace.	
1736. RADAR ARRIVALS TERMINAL	1735. RADAR ARRIVALS (10-35)
All conditions of 796. are applicable except minima visibility requirement is 5 statute miles.	No change.
1736. Reference - Visual Approach, 796.	
	1736. EMERGENCY (10-36)
	a. Consider that an aircraft is in distress or experiencing an emergency if you observe:
	(1) an SSR reply on code 7500, 7600 or 7700; or
	(2) a triangle distress pattern



right-hand pattern with receiver operating only



left-hand pattern with transmitter and receiver inoperative

OLD	NEW
	b. Take action to separate all other aircraft from a nonidentified aircraft that is replying on code 7600 or 7700.

4. Operational Change

This change accommodates the Canadian Airspace Reorganization and Classification, effective May 10, 1984; incorporates Canadian procedures that are more stringent than those in the U.S., and includes revisions required for text accuracy. Personnel involved in the control of air traffic within delegated airspace over the territory of Canada are required to become familiar with the numerous changes in the following areas:

a. Canadian Airspace Classifications.
b. Communication Failure.
c. Parachute Jumping.
d. Transponder/Mode C Deviations.
e. Longitudinal, Lateral and Vertical Separation.
f. Visual Separation and VFR.
g. Lengthy Delays.
h. Altitude for Direction of Flight - Aircraft maintaining 1,000 on top may operate up to but not including 12,500 feet only. Aircraft are not permitted to operate 1,000 on top at and above 12,500 feet.
i. Passing-Opposite Courses.
j. Emergencies.

(Butler, AAT-320.8)

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memorandum

Subject: **ACTION:** Change to FAA Handbook 7110.65/AIM,
Pilot/Controller Glossary

Reply to
Attn. of: Ponds:426-8532

To: AAT-200

Add the following to the Pilot/Controller Glossary in the next revision to FAA Handbook 7110.65/AIM:

> DIRECTION ALTITUDE AND IDENTITY READOUT/DAIR - The DAIR System is a modification to the AN/TPX-42 Interrogator System. The Navy has two adaptations of the DAIR System, Carrier Air Traffic Control Direct Altitude and Identification Readout System for Aircraft Carriers and Radar Air Traffic Control Facility Direct Altitude and Identity Readout System for land based terminal operations. The DAIR detects, tracks, and predicts secondary radar aircraft targets. Targets are displayed by means of computer generated symbols and alphanumeric characters depicting flight identification, altitude, ground speed, and flight plan data. The DAIR System is capable of interfacing with ARTCC's.

#

HANDBOOK : Pilot/Controller Glossary
EFFECTIVE: October 25, 1984

HANDBOOK CHANGE BRIEFING SHEET

1. PARAGRAPH:

Please make the following change to the Pilot/Controller Glossary, effective October 25, 1984.

2. BACKGROUND:

The Central Region recommended that the definition of "intersection" be expanded to have broader application. This recommendation was submitted to the field for comment and resulted in overwhelming support.

3. CHANGE:

OLD	NEW
Definition 1, unchanged.	
1. A point defined by any combination of courses, radials, or bearings of two or more navigational aids.	
Definition 2, change to read:	2. Used to describe the point where two runways, a runway and a taxiway, or two taxiways cross or meet.

4. This change expands the definition of "Intersection" to include points where taxiways and/or runways meet.

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memorandum

Subject: ACTION: Addition to the Pilot/Controller Glossary

Reply to
Attn. of: Rood:426-8511

To: AAT-200

I. Please add the following definition to the Pilot/Controller Glossary, effective October 25, 1984.

II. BACKGROUND:

For many years, the term "when able" has been used by controllers and understood by pilots. For example: "Cessna 123, when able turn right heading (degrees); or Cessna 123 (as applied to aircraft deviating around weather) deviation approved, when able proceed direct (fix or intersection/way point)." However, the term was not defined in any of our directives.

III. CHANGE:

Add to the Pilot/Controller Glossary; WHEN ABLE - When used in conjunction with ATC instructions, gives the pilot the latitude to delay compliance until a condition or event has been reconciled. Unlike "pilot discretion," when instructions are prefaced "when able," the pilot is expected to seek the first opportunity to comply. Once a maneuver has been initiated, the pilot is expected to continue until the specifications of the instructions have been met. "When able." should not be used when expeditious compliance is required.

IV. A definition is now provided for common use of "when able" by controllers and understanding by pilots.

#

*U.S. GOVERNMENT PRINTING OFFICE : 1984 O-421-018/16601

Ac 7/3/984/divider

NEWARK PUBLIC LIBRARY
DEC 2 0 1984
U. S. GOVT. PUBS.
DEPOSITORY 376

Chapter 1

INTRODUCTION

TD4.308:

Chapter 2

GENERAL

Chapter 3

AIRPORT TRAFFIC CONTROL—TERMINAL

Chapter 4

IFR

Chapter 5

RADAR

Chapter 6

NONRADAR

Chapter 7

VISUAL

Chapter 8

SPECIAL FLIGHTS

Chapter 9

EMERGENCIES

Chapter 10

CANADIAN AIRSPACE PROCEDURES

Appendix A

PILOT/CONTROLLER GLOSSARY

Appendix B

AIRCRAFT WEIGHT CLASSES AND GROUPS

Appendix C

STANDARD OPERATING PRACTICE (SOP) FOR TRANSFER OF RADAR IDENTIFICATION AND ASSOCIATED COORDINATION

Appendix D

STANDARD OPERATING PRACTICE (SOP) FOR THE TRANSFER OF POSITION RESPONSIBILITY

Index